Agency: Commerce, Community and Economic Development

Project Title:

Alaska Energy Authority - Southeast Conference for the Reynolds Creek Hydroelectric Project

State Funding Requested: $ 2,000,000 **House District:** 5 - C
One-Time Need

Brief Project Description:

Hydro project will supplement power to Prince of Wales Island which is experiencing growth and straining current power sources.

Funding Plan:

Total Cost of Project: $13,000,000

	Funding Secured		Other Pending Requests		Anticipated Future Need	
	Amount	*FY*	*Amount*	*FY*	*Amount*	*FY*
Denali Commission			$1,100,000	2009		
Other	$2,000,000	2007			$8,600,000	2010, 2011
Total	$2,000,000		$1,100,000		$8,600,000	

Explanation of Other Funds:

Haida Corporation has invested $2 million into the project and will be actively seeking additional funds to continue the project to completion.

Detailed Project Description and Justification:

This project will be overseen by AEA and SE Conference and will consist of construction a hydroelectric facility on Reynolds Creek on Prince of Wales Island. Along with the hydro facility, a 10.5 mile transmission line will also need to be constructed in order to connect into the existing grid on Prince of Wales Island.

Prince of Wales Island is experiencing population growth as well as economic development in the establishment of mines on the Island. This has put a strain on the already overstressed power grid on the Island resulting in the usage of more diesel fuel.

The project at Reynolds Creek will produce 19.3 million kilowatt hours of power a year and will be able to adequately supplement the current power system and reduce power costs on the entire Island while still allowing for population and economic growth.

In addition, transmission lines are planed to two particularly isolated communities who exist solely on diesel fuel. The transfer of these communities to hydroelectricity from diesel fuel will drastically reduce the cost of power and improve the quality of life in these communities and the Island as a whole.

The back up materials include letters of support from the City of Hydaburg, Sealaska, Congressman Young, Hydaburg Cooperative Association, and the Alaska Federation of Natives, Inc.

For use by Co-chair Staff Only:

Contact Name: Kaci Schroeder Hotch
Contact Number: 465-3306

4:29 PM 4/29/2008

Project Timeline:

Project began in 2007 and is estimated to be completed by 2011

Entity Responsible for the Ongoing Operation and Maintenance of this Project:

Southeast Conference

Grant Recipient Contact Information:

Contact Name: Shelly Wright, Executive Director
Phone Number: 907-523-2310
Address: P.O. Box 21989, Juneau, AK 99802
Email: shellyw@seconference.org

Has this project been through a public review process at the local level and is it a community priority? [ ] Yes [X] No

Contact Name: Kaci Schroeder Hotch
Contact Number: 465-3306

For use by Co-chair Staff Only:

4:29 PM 4/29/2008

ALASKA POWER & TELEPHONE COMPANY
PO BOX 3222 – 193 OTTO STREET
PORT TOWNSEND, WA 98368
(360) 385-1733 – (800) 982-0136
FAX (360) 385-5177

February 15, 2008

Representative William Thomas
State of Alaska
House of Representatives
(Fax No. 907-465-2652)

RE: Reynolds Creek Project – in partnership with the Haida Corporation

Dear Representative Thomas:

This letter is to advise you that Alaska Power & Telephone will be partnering with the Haida Corporation on the construction and development of the Reynolds Creek Project on Prince of Wales Island. As the certified electric utility in this partnership, we are requesting your consideration of a State of Alaska grant in the amount of $ 5,000,000 to develop the Reynolds Creek Project.

We believe the Reynolds Creek Hydroelectric Project is the best long term energy solution for the residents of Prince of Wales Island.

Sincerely,

Robert S. Grimm, President
Alaska Power & Telephone Co.

Sealaska
CORPORATION

February 13, 2008

Senator Bert Stedman
Senator Lyman Hoffman
Representative Bill Thomas

RE: SUPPORT AND REQUEST FOR INCLUSION OF LEGISLATIVE APPROPRIATION FOR $5.5 MILLION DOLLAR FOR REYNOLDS CREEK HYDROELECTRIC PROJECT

Honorable Senator Stedman, Senator Hoffman & Representative Thomas:

Haida Corporation received a communication indicating that the Reynolds Creek Project would not be included within the Governors 2009 Budget. In response to the letter drafted by Karen Rehfeld, OMB Director, Haida Corporation requested that the Sealaska Board of Directors provide written support for the Reynolds Creek Project as their number one priority and to request a legislative appropriation for 5.5 million dollars. As President and CEO of Sealaska and on behalf of the Sealaska Board of Directors, this letter supports Haida Corporations request.

Please allow me to explain why this funding is crucial. We are facing huge outmigration from our villages because the economy is in decline. It's evident that reliable, sustainable and competitively priced power is one of the cornerstones to a healthy and sustainable village economy. This funding will allow the project to go to construction, utilize a very valuable Federal Energy Regulatory Permit (FERC) license and allow additional time to obtain matching federal dollars to complete the project in a timely manner. The Reynolds Creek Hydroelectric Project ("Reynolds Creek" or the "Project") is a potential 5-megawatt hydroelectric resource to be constructed on Prince of Wales Island in Southeast Alaska. The Project has been reviewed by the Federal Energy Regulatory Commission ("FERC"), and a license to construct, own, and operate Reynolds Creek (FERC Project No. 11480) was issued to the Haida Corporation (the "Corporation") on October 24, 2004. At the time the FERC license was issued, the village of Hydaburg was electrically isolated from other communities on Prince of Wales Island, and the initial plan was to use Reynolds Creek for Hydaburg loads and then integrate it into the remaining system when the transmission grid was expanded. Prior to initiating detailed design, however, the utility providing service on the island, the Alaska Power Company ("APC"), expanded the transmission grid to Hydaburg and began developing its South Fork Hydroelectric Project

HAIDA CORPORATION

January 15, 2008

The Honorable Governor Palin
Governor
State of Alaska
P.O. Box 11001
Juneau, Alaska 99811-0001

RE: **Reynolds Creek Hydroelectric Project Funding Request**

Recently, I traveled to Juneau to follow-up on the status of Haida Corporations request for your support for the Reynolds Creek Hydroelectric Project, located 10 miles east of the city of Hydaburg. **I am requesting $11 millions to be included in your budget for the FY 2009 to fully fund and complete construction of this project.** This important renewable energy alternative project will play an important role in displacing diesel fuel generation in the Southeast region while supporting economic development on Prince of Wales island.

The urgency of this request to fund this project must be conveyed as the Federal Energy Regulatory Commission (FERC) permit required to go to construction must be initiated by October 1, 2010. As I have expressed in recent meetings with both Joe Balush, Governors Special Assistant and Department of Commerce Commissioner Emil Notti this is a feasible, low-risk project which reduces energy costs to the tax-payers, provides a construction opportunity for local entities with a proven hydroelectric project success record, reduces the need for power cost equalization (PCE) funds, allows an incentive to promote business opportunities and provides an opportunity for the successful and timely project completion of a solid funding package.

Haida Corporation has invested nearly two million dollars because we believe by reducing our reliance on diesel fuel we can reduce our energy costs and promote and provide economic development opportunities for the entire Prince of Wales island.

This project has received letters of support from the following: The city of Hydaburg, the Tribe, the Congressional delegation, the Alaska legislative delegation, the Alaska Federation of Natives (via a support resolution), Alaska Power and Light and Sealaska Corporation. Today I received notice that Prince of Wales is currently running on diesel fuel which encourages me to continue to promote this particular project and convey to you the urgency of our need.

P.O. Box 89 ● Hydaburg, Alaska 99922 ● (907) 285-3721 ● Fax: (907) 285-3944
www.haidacorp.com

REYNOLDS CREEK

The Reynolds Creek Project now being considered by the Corporation is a hydroelectric storage resource approximately ten miles east of Hydaburg. The creek itself runs from Lake Mellen, at an approximate elevation of 900 feet, to tidewater at Copper Harbor. A small dam and intake structure will be located near Lake Mellen and divert the water from the creek to a powerhouse located at a lower elevation. The installed capacity of the Project is licensed to be 5.0 megawatts, and average annual energy production is projected to be approximately 19.3 million kilowatt-hours. Power will be transmitted from the powerhouse over a 10.9-mile, 34,500-volt transmission line. The line will interconnect the Project with APC's interconnected grid on Prince of Wales Island.

HDR Engineering, Inc. ("HDR") updated previous construction cost estimates, and the development costs are now estimated to be approximately $11,000,000 in 2007 dollars. The cost estimate is detailed in Table 3 on the following page. Based on an assumed on-line date of January 2011, inflation is projected to add over $700,000 to the total project costs.

Annual operating and maintenance activities will include labor, miscellaneous on-going maintenance, periodic renewals and replacements of system components, and FERC monitoring activities. It is anticipated that the Project will be operated remotely, and the Corporation is exploring the opportunity of having APC operate the Project. A reasonable proxy of operating costs is, therefore, APC's operating costs of Black Bear. Table 4 on page 7 summarizes APC's costs on file with the Regulatory Commission of Alaska ("RCA") for operating Black Bear. Costs including insurance, allocated labor, vehicles and allocated overheads but exclusive of land lease payments to Sealaska total approximately $150,000 - 200,000 per year. For purposes of this analysis, annual operating costs are assumed to be $200,000 per year.

Bill:

Reynolds Creek Construction Costs

(Nominal Dollars)

	Equity	Grants	Equity/Debt	Total
Prior*	$ 2,000,000	$ -	$ -	$ 2,000,000
2007	300,000		-	300,000
2008		1,000,000	700,000	1,700,000
2009		6,000,000	1,400,000	7,400,000
2010			2,300,000	2,300,000
Total	$ 2,300,000	$ 7,000,000	$ 4,400,000	$ 13,700,000

* Includes approximately $2 million spent to date by the Haida Corporation on licensing efforts and feasibilty analyses.

Development of the Reynolds Creek Hydroelectric Project

Haida Corporation (Haida), an Alaska Native Village corporation established under the Alaska Native Claims Settlement Act of 1971 (ANCSA), is pursuing the development of the 5 megawatt (MW) Reynolds Creek Hydroelectric Project. Haida is seeking state and federal financial assistance towards the capital expenditures to support the development of this significant renewable energy Project.

Haida Corporation

Haida Corporation is an Alaska Native Village Corporation operating for the benefit of the Haida Indian people, most of which are residents of the Village of Hydaburg in Southeast Alaska. Haida Corporation's mission is as follows:

Our mission is to protect our land and spirit, because we have learned from our ancestors that the land is critical to the culture and spirit of the Haida people. Haida Corporation is committed to maintaining the ownership and stewardship of the land. We will maintain a profitable native owned Corporation that makes a difference in the lives of the present and future shareholder through economic benefits, while promoting culture and heritage.

The Reynolds Creek Hydroelectric Project

License: Consistent with its mission, Haida in 1997 applied to the Federal Energy Regulatory Commission (FERC) for a license to construct and operate the Reynolds Creek Hydroelectric Project. In 1999, the State of Alaska issued its determination that the Project is consistent with the Alaska Coastal Management Program. In October, 2004, Haida received a 50 year federal license for the Project, designated FERC Project No. 11480. Subsequent federal legislation authorized extension of the construction deadline, which is currently October 24, 2008 (with an additional 2-year extension to 2010 available from FERC if necessary).

Location: The 5 MW Project would be located on Reynolds Creek, 10 miles east of the City of Hydaburg, on Prince of Wales Island in Southeast Alaska. The Project does not encompass any federal lands. All Project lands are owned by Haida or will be acquired or leased from Sealaska Corporation or the State of Alaska. (*A map of the Project location is attached.*)

Design: The Project will consist of a small diversion dam (20-foot-long, 6-foot-high); a 3,200-foot-long penstock; a 150-acre lake with 600 acre-feet of new storage capacity; a powerhouse with one or two horizontal impulse turbine/generator(s) with a total capacity of 5 MW and average annual generation projected to be 19.3 million kilowatt-hours; and an overhead 34.5-kilovolt, 10.9-mile transmission line.

Need for Project Power: By producing hydroelectricity, the Reynolds Creek Project displaces the increasing need for diesel generation, thereby avoiding those power plant greenhouse gas emissions and creating an environmental benefit. In Southeast Alaska where the Project is located, the alternative fuel to hydropower is almost entirely diesel. Fuel costs have increased significantly in the past several years and are expected to increase in the future.

Electric utility service at most locations of Prince of Wales Island is provided by Alaska Power Company (APC). Most of APC's service territory is interconnected. Generation for the interconnected grid is primarily hydroelectric from two existing hydro resources with diesel used to meet supplemental requirements. Power requirements of the isolated communities are met with diesel generation. Power from Reynolds Creek would be sold to APC to offset the increasing need for diesel power in the interconnected grid. APC plans to expand its transmission system to interconnect two electrically isolated communities into the system, thereby increasing the need for hydro power. Furthermore, two mining ventures are actively considering operations on the island, and power requirements would be met from diesel generation without Reynolds Creek power.

Cost: Project development costs from October 1, 2007, and thereafter are now estimated at approximately $11,000,000. Based on an assumed on-line date of January 2011, inflation is projected to add over $700,000 to total Project costs. Annual operating costs and land lease payments are approximately $300,000. (*A summary of Project construction costs is attached.*)

Financial Return/Grant Requirements: Although Reynolds Creek can provide economic benefits to the ratepayers over the expected life of the project, Haida's return on investment is dependent upon the power sales rate (to be negotiated with APC) and the timing of load growth in the region. With reasonable load growth and a power sales rate approaching avoided cost, the Project should provide a positive return on investment, but not at a level commensurate with the inherent risk this type of capital-intensive project. While Haida is willing to assume the risk of this Project, federal and state assistance in the range of $7 million will help ease the initial burden on Haida in pursuing this important renewable energy development Project.

The Public Interest: The significant capital investment required to construct and develop hydroelectric power projects often presents inadequate financial return in the initial years that can preclude beneficial project development by entities such as rural communities and Alaska Native corporations. The long term benefits of renewable hydroelectric power development, both financially and environmentally, are well established and can serve to spur further beneficial economic development for local communities. The high cost of reliance on increasingly more expensive diesel fuel has created a crisis situation in rural Alaska that must be addressed. Alaska Natives, through their communities and corporations, should be encouraged to participate directly in the ownership and development of their local hydroelectric resources and receive the financial support to assure such development.

For further information please contact: Lisa Lang, President, Haida Corporation, (907) 229-1540, lisaverosh@hotmail.com; Don Clarke, Law Offices of GKRSE, (202) 408-5400 dhclarke@gkrse-law.com;or Jaeleen Kookesh Araujo, Van Ness Feldman PC, (202) 298-1983, jka@vnf.com.

DON YOUNG
CONGRESSMAN FOR ALL ALASKA

WASHINGTON OFFICE
2111 RAYBURN BUILDING
TELEPHONE 202/225-5765
WWW.HOUSE.GOV/DONYOUNG/

Congress of the United States
House of Representatives
Washington, DC 20515

CHAIRMAN
COMMITTEE ON
TRANSPORTATION

COMMITTEE ON
RESOURCES

COMMITTEE ON
HOMELAND SECURITY

November 5, 2007

Karen J. Rehfield
Director, Alaska Office of Management and Budget
P.O. Box 110020
Juneau, Alaska 99811-0020

Dear Ms. Rehfield,

Haida Corporation (Haida), an Alaska Native Village corporation established under the Alaska Native Claims Settlement Act of 1971, is pursuing the development of the 5 megawatt Reynolds Creek Hydroelectric Project located on Reynolds Creek, 10 miles east of the City of Hydaburg, on Prince of Wales Island in Southeast Alaska. This important renewable energy project will play an important role in displacing diesel fuel generation in the region while supporting economic development on Prince of Wales Island.

Haida is seeking financial assistance from the State of Alaska and federal sources to support the development of this significant renewable energy project. The Reynolds Creek Project already has a Federal Energy Regulatory Commission (FERC) license and actual construction can be undertaken in the near term. We should not pass up this important opportunity.

I fully support Haida's development of the Reynolds Creek Project and respectfully request that you and your colleagues in the State government garner all the necessary financial and other resources at hand to make this Project a reality. Thank you for your consideration of this important, federally-licensed project.

Sincerely,

Don Young
Congressman for All Alaska

510 L STREET
SUITE 580
ANCHORAGE, AK 99501

311 WILLOW ST, #3
P.O. BOX 1030
BETHEL, AK 99559

101 12TH AVENUE
BOX 10
FAIRBANKS, ALASKA 99701

971 FEDERAL BUILDING
P.O. BOX 21247
JUNEAU, ALASKA 99802

130 TRADING BAY ROAD
SUITE 105
KENAI, ALASKA 99611

540 WATER STREET
SUITE 101

951 EAST WESTPOINT DRIVE
SUITE 307

COPY

State Capitol
Juneau AK, 99801-1182

SENATOR ALBERT M. KOOKESH
REPRESENTATIVE BILL THOMAS
SENATE DISTRICT C, HOUSE DISTRICT 5

November 7, 2007

Honorable Governor Sarah Palin
P.O. Box 110001
Juneau, AK 99877-0001

RE: Haida Corporation

Dear Governor Palin,

Haida Corporation (Haida), an Alaskan Native village corporation established under the Alaska Native Claims Settlement Act of 1971, is pursing the development of a 5 megawatt Reynolds Creek Hydroelectric Project located on Reynolds Creek, 10 miles east of the city of Hydaburg, on Prince of Wales Island in Southeast Alaska. This important renewable energy project will play an important role in displacing diesel fuel generation in the region while supporting economic development on Prince of Wales Island.

Haida is currently seeking phase I financial assistance from the State of Alaska to match the federal sources that will support the development of this significant renewable project. We write to you to convey our full joint support of Haida's development of the Reynolds Creek Project. To make this project a reality, we respectfully encourage that you and your colleagues include the necessary phase I amount of 2.5 million in your FY 2008 capital budget that has been requested by Haida Corporation. Thank you for your consideration of this important, federally-licensed project.

Sincerely,

Albert Kookesh
Senator Albert Kookesh

Bill Thomas
Representative Bill Thomas

CC: Haida Corporation
Karen Rehfield
Congressman Don Young

SEALASKA

November 5, 2007

The Honorable Sarah Palin
Governor
State of Alaska
P.O. Box 110001
Juneau, AK 99811-0001

RE: Support for Haida Corporation's Reynolds Creek Hydroelectric Project

Dear Governor Palin:

Sealaska Corporation, the Alaska Native Claims Settlement Act (ANCSA) regional corporation for Southeast Alaska, supports the proposed Reynolds Creek Hydroelectric Project located on Prince of Wales Island in Southeast Alaska initiated by Haida Corporation, the ANCSA village corporation for Hydaburg. The development of hydro power projects is important to the small communities because they provide cleaner, more reliable and more economical energy than diesel generators. Many communities on Prince of Wales Island are already benefiting from hydro power, but the demand will soon exceed the supply. Completion of the Reynolds Creek project will provide enough additional energy to meet the demand for the foreseeable future.

The intake, penstock, and powerhouse are located on Sealaska land, and much of the proposed transmission line route is also over Sealaska-owned land. Sealaska is in discussions with Haida Corporation on the use of Sealaska's property for development of this project. Sealaska has experience with the Black Bear Lake hydro project also on Prince of Wales Island and is providing Haida Corporation technical assistance.

If you have any questions or would like additional information, please contact Michele Metz, Assistant Lands Manager, Natural Resources Department at 907.586.9270 or michele.metz@sealaska.com. Thank you.

Sincerely,

SEALASKA CORPORATION

Richard P. Harris
Executive Vice President

cc: Senator Ted Stevens
Senator Lisa Murkowski
Congressman Don Young

HYDABURG COOPERATIVE ASSOCIATION

PO BOX 349
HYDABURG, ALASKA 99922
Phone: 907-285-3666, 3665, 3660 or 3662

November 6, 2007

To Whom It May Concern:

Hydaburg Cooperative Association (HCA) Tribal Council would like to state our support for the Reynolds Creek Project. HCA is the tribal government in Hydaburg, Alaska and represents 450 tribal members, 350 of whom live in Hydaburg, Alaska. The community of Hydaburg and the surrounding area will benefit greatly from this project.

The HCA Tribal Council will adopt a resolution at our next regularly scheduled meeting to demonstrate tribal support of the Reynolds Creek Project.

Sidney Edenshaw
President

ALASKA FEDERATION OF NATIVES, INC.

2007 ANNUAL CONVENTION

RESOLUTION 07-36

TITLE: IN SUPPORT OF AFFORDABLE ENERGY DIVERSITY THROUGH THE DEVELOPMENT OF THE HYDROELECTRIC PROJECTS

WHEREAS: Alaska Natives living in rural Alaska pay some of the highest prices in the country for fuel and many live near or below the poverty level;

WHEREAS: the recent, dramatic increase in the cost of fuel in rural Alaska is having a dramatic impact on limited household and community financial resources;

WHEREAS: the increased cost of fuel is threatening the economic viability of rural Alaska families and communities and inflating electric generation costs;

WHEREAS: dependency on diesel within Alaska native villages exposes rural Alaska families and communities to unacceptable financial burdens and adverse environmental impacts;

WHEREAS: small hydroelectric power development presents a renewable, indigenous alternative to diesel fueled generation of electric power for many Alaska Natives, eliminating fuel cost volatility, noxious emissions, and the risk of fuel spills;

WHEREAS: the significant capital investment required to construct and develop hydroelectric power projects often presents inadequate financial return in the initial years that can preclude project development by rural communities and Alaska Native corporations;

WHEREAS: the long term benefits of renewable small hydroelectric power development, both financially and environmentally, are well established and can serve to attract further beneficial economic development for local communities;

WHEREAS: Alaska Natives, through their communities and corporations, should be encouraged to participate directly in the ownership and development of their local hydroelectric resources and receive the financial support to assure such development;

NOW, THEREFORE BE IT RESOLVED by the Delegates to the 2007 Annual Convention of the Alaska Federation of Natives that AFN hereby endorses and approves of the development of the Hydroelectric Project such as Reynolds Creek by Haida Corporation in order to provide clean reliable electric power generation for the communities of Alaska; and,

BE IT FURTHER RESOLVED that AFN supports organizations in their efforts to obtain financial assistance at the state and federal levels to assure acceptable investment requirements and economically viable development of these important renewable energy projects; and

BE IT FINALLY RESOLVED that AFN send a copy of this resolution to Alaska's Congressional Delegation, the Governor of the State of Alaska and members of the Alaska State Legislature.

SUBMITTED BY: HAIDA CORPORATION

COMMITTEE ACTION: DO PASS

CONVENTION ACTION: TIER ONE STATUS

Principal Project Components

- 20-ft long, 6-ft high Diversion Structure at Outlet of Rich's Pond
- Lake Mellen/Rich's Pond provide 600 acre-feet of storage
- 42-inch diameter, 3200-ft long Penstock
- Powerhouse (One 5 Megawatt Unit)
- 34 kV, 10.9-mile long Transmission Line

Technical Readiness

- Feasibility / Preliminary Design -- Completed
- Confirmed by RDA International, Inc.
- Utilizes Simple, Proven Technology
- Final Design – to be initiated in early 2008
- Alaska Power Company will provide oversight of final design

Prerequisites for Construction

- Amend FERC License to Allow 5 MW Unit (2007/2008)
- Secure Grant Funding (2007/2008)
- Prepare Detailed Plan and Schedule Leading to Project Construction and Operation (2007)
- Prepare Plans Required by FERC License (2008)
- Obtain Remaining Approvals (2007/2008)
- Negotiate Power Sales Agreement (2007/2008)
- Initiate & Complete Final Design (2008)

Recent Activities

- Discussions with State and Federal Officials re Grants
- Memorandum of Understanding Established with Alaska Power Company
- Power Sales Agreement Discussions with Alaska Power Company
- 5 MW Unit Information Submitted to ADNR
- Land Lease Discussions with Sealaska

Letters of Support Received From:

- Congressman Don Young
- Senator Albert Kookesh
- Representative Bill Thomas
- Richard Harris, Executive Vice President, Sealaska
- Sidney Edenshaw, President, Hydaburg Cooperative Association
- Bob Grimm, President, Alaska Power Company

Economic Feasibility and Grant Funding

- Economic Feasibility Study Updated by the Financial Engineering Company
- Feasibility Study Examines Various Load and Grant Funding Scenarios
- Demonstrates Importance of State and Federal Grants to Project Economics

2008 Activities

- Complete Land Lease Negotiations with Sealaska
- Complete Power Sales Agreement
- Complete Financing Plan
- Develop Plans Required by FERC License and Project Permits
- Amend FERC License to Install 5 MW Unit
- Continue to Pursue Grants
- Complete Project Design
- Order Turbine/Generator

Estimated Major Milestones

- Order Turbine/Generator – August 2008
- Complete Final Design - November 2008
- Begin Construction – April 2009
- Begin Operation – Late 2010/Early 2011

STATE OF ALASKA

SARAH PALIN, GOVERNOR

OFFICE OF THE GOVERNOR

OFFICE OF MANAGEMENT AND BUDGET

P.O. BOX 110020
JUNEAU, ALASKA 99811-0020
TELEPHONE: (907) 465-4660
FAX: (907) 465-3008

February 6, 2008

The Honorable Albert Kookesh
Alaska State Senator
State Capitol, Room 11
Juneau, AK 99801-1182

The Honorable Bill Thomas
Alaska State Representative
State Capitol, Room 434
Juneau, AK 99801-1182

Dear Senator Kookesh and Representative Thomas:

Thank you for your letter regarding Haida Corporation's funding request for a five megawatt hydroelectric project located on Reynolds Creek. As you know, the Governor strongly supports affordable, reliable energy for Alaskans through comprehensive regional planning and the development of new sources.

The Governor released her proposed FY2009 operating and capital budgets on December 10, 2007. Funding specific to the Reynolds Creek project was not included in these budgets. However, the Governor's budget includes funds for a strategic energy plan and a $250 million set-aside for an energy fund. These funds will be invested in energy projects recommended by the strategic energy plan. In addition, another $10 million is proposed for alternative energy projects through the Alaska Energy Authority.

The proposed budget is the starting point for discussion with the Legislature. We look forward to working with you and other legislators and the public to develop responsible and sustainable budgets for the state of Alaska.

Sincerely,

Karen J. Rehfeld
Director

HAIDA CORPORATION

EIN:

January 15, 2008

The Honorable Governor Palin
Governor
State of Alaska
P.O. Box 11001
Juneau, Alaska 99811-0001

RE: **Reynolds Creek Hydroelectric Project Funding Request**

Recently, I traveled to Juneau to follow-up on the status of Haida Corporations request for your support for the Reynolds Creek Hydroelectric Project, located 10 miles east of the city of Hydaburg. **I am requesting $11 millions to be included in your budget for the FY 2009 to fully fund and complete construction of this project.** This important renewable energy alternative project will play an important role in displacing diesel fuel generation in the Southeast region while supporting economic development on Prince of Wales island.

The urgency of this request to fund this project must be conveyed as the Federal Energy Regulatory Commission (FERC) permit required to go to construction must be initiated by October 1, 2010. As I have expressed in recent meetings with both Joe Balush, Governors Special Assistant and Department of Commerce Commissioner Emil Notti this is a feasible, low-risk project which reduces energy costs to the tax-payers, provides a construction opportunity for local entities with a proven hydroelectric project success record, reduces the need for power cost equalization (PCE) funds, allows an incentive to promote business opportunities and provides an opportunity for the successful and timely project completion of a solid funding package.

Haida Corporation has invested nearly two million dollars because we believe by reducing our reliance on diesel fuel we can reduce our energy costs and promote and provide economic development opportunities for the entire Prince of Wales island.

This project has received letters of support from the following: The city of Hydaburg, the Tribe, the Congressional delegation, the Alaska legislative delegation, the Alaska Federation of Natives (via a support resolution), Alaska Power and Light and Sealaska Corporation. Today I received notice that Prince of Wales is currently running on diesel fuel which encourages me to continue to promote this particular project and convey to you the urgency of our need.

P.O. Box 89 ● Hydaburg, Alaska 99922 ● (907) 285-3721 ● Fax: (907) 285-3944
www.haidacorp.com

HAIDA CORPORATION

I have enjoyed my meetings in Juneau as your commissioners and special assistants have been direct, honest and helpful in assisting me to understand the process you are currently utilizing. I have done the absolute best in communicating the needs and desires of my home community and I would like to have a response from you on this particular funding request. My intent is to continue to strongly advocate for the potential economic future of Prince of Wales island.

Please contact me immediately if you need briefing materials, additional information or a copy of our recent updated economic analysis for this project. I would like the opportunity to explain the potential mining, fish processing and potential economic opportunities this project will support.

Sincerely,

Lisa M. Lang
President
Haida Corporation
(907) 229-1540

CC: Karen J. Rehfeld, Director, OMB
Department of Commerce, Commissioner Notti
Joe Balush, Governors Special Assistant
Senator Ted Stevens
Senator Lisa Murkowski
Congressman Don Young
Representative Bill Thomas
Senator Albert Kookesh
Richard Harris, SEALASKA
Bob Grimm, Alaska Power & Telephone

P.O. Box 89 ● Hydaburg, Alaska 99922 ● (907) 285-3721 ● Fax: (907) 285-3944
www.haidacorp.com

(?)

HYDABURG COOPERATIVE ASSOCIATION
P.O. BOX 349
HYDABURG, ALASKA 99922
PHONE 907-285-3666 • FAX 907-285-3541

I'm assuming you have copy, but just incase (1).

RESOLUTION 2007-24

TITLE: IN SUPPORT OF AFFORDABLE ENERGY DIVERSITY THROUGH THE DEVELOPMENT OF THE HYDROELECTRIC PROJECTS

WHEREAS: Alaska Natives living in rural Alaska pay some of the highest prices in the country for fuel and many live near or below the poverty level;
WHEREAS: the recent, dramatic increase in the cost of fuel in rural Alaska is having a dramatic impact on limited household and community financial resources;
WHEREAS: the increased cost of fuel is threatening the economic viability of rural Alaska families and communities and inflating electric generation costs;
WHEREAS: dependency on diesel within Alaska native villages exposes rural Alaska families and communities to unacceptable financial burdens and adverse environmental impacts;
WHEREAS: small hydroelectric power development presents a renewable, indigenous alternative to diesel fueled generation of electric power for many Alaska Natives, eliminating fuel cost volatility, noxious emissions, and the risk of fuel spills;
WHEREAS: the significant capital investment required to construct and develop hydroelectric power projects often presents inadequate financial return in the initial years that can preclude project development by rural communities and Alaska Native corporations;
WHEREAS: the long term benefits of renewable small hydroelectric power development, both financially and environmentally, are well established and can serve to attract further beneficial economic development for local communities;
WHEREAS: Alaska Natives, through their communities and corporations, should be encouraged to participate directly in the ownership and development of their local hydroelectric resources and receive the financial support to assure such development;

NOW, THEREFORE BE IT RESOLVED by Hydaburg Cooperative Association (HCA) that HCA hereby endorses and approves of the development of the Hydroelectric Project such as Reynolds Creek by Haida Corporation in order to provide clean reliable electric power generation for the communities of Alaska; and,
BE IT FURTHER RESOLVED that HCA supports organizations in their efforts to obtain financial assistance at the state and federal levels to assure acceptable investment requirements and economically viable development of these important renewable energy projects; and

BE IT FINALLY RESOLVED that HCA send a copy of this resolution to Alaska's Congressional Delegation, the Governor of the State of Alaska and members of the Alaska State Legislature.

Adopted this 5th day of Dec. 2007, by the Hydaburg Cooperative Association by a vote of 4 yeas, 0 nays, abstentions, and 2 absences.

CERTIFIED

Sidney Edenshaw

ATTESTED

Jean Bland

Tribal Secretary

City of Hydaburg

P.O. Box 49
Hydaburg, Alaska 99922
907-285-3761 Phone
907-285-3760 Fax

February 14, 2008

Senator Albert M. Kookesh, District C
Alaska State Capital, Room 7
Juneau, Alaska 99801-1182

Representative William Thomas, District 5
Alaska State Capital, Room 428
Juneau, Alaska 99801-1182

Re: City of Hydaburg's Capital Project Requests

Dear Senator Kookesh and Representative Thomas:

The City of Hydaburg would like to support the Reynolds Creek Hydroelectric Project as the community's number one economic development project, but it is important to underscore our serious need for water and sewer system upgrades. The water and sewer remains our number one priority for health and safety project for the community.

The community and the city council realize the need to support the Reynolds Creek project and we are writing to express that support.

Sincerely,

Anthony Christianson
Mayor

City of Hydaburg

Office of the City Administrator
P.O. Box 49
Hydaburg, AK 99922
Phone: 907-285-3761
Fax: 907-285-3760

February 14, 2008

Senator Albert M. Kookesh, District C
Alaska State Capitol, Room 7
Juneau, Alaska 99801-1182

Representative William Thomas, District 5
Alaska State Capitol, Room 428
Juneau, Alaska 99801-1182

Dear Senator Kookesh and Representative Thomas:

Enclosed are the background materials for our legislative request; these items are:

- *Hydaburg Water Source Development Project* and *Water Source Study* from 1984 (9 pages)
- *Hydaburg, Alaska: Water Source Conservation and Optimization Study* (ANTHC Project No. AN 02-Q88) (45 pages)

We are still attempting to locate a copy of the *Dam Safety Inspection Report of the Hydaburg River Dam (AK 00120).*

If you need further information, please don't hesitate to call.

Sincerely,

Adrian LeCornu
Administrator

Hydaburg Water Source Development Project

Project Summary

The community of Hydaburg's water supply has experienced problems with quality and quantity for a number of years. In 1984, the City accepted a report by Pool Engineering, Inc. entitled *Hydaburg Water Resources Study*. The purpose of that study was to investigate a range of possible water source sites that could provide a reliable water supply system with low operating costs, capable of meeting community needs through the year 2020.

The City of Hydaburg adopted the course of actions outlined in 1984, and have accomplished the first two phases of the project. The community now seeks funding to accomplish the final two phases of the project.

The following estimate of the costs associated with accomplishing Phase 3 and Phase 4 are listed below. Estimates were obtained by increasing the Pool Engineering 1984 estimates by approximately 43% to reflect the economic changes in the past sixteen years.

Phase 3—Pipe Extension to North Branch of Hydaburg River

Infiltration gallery	$ 100,000
Pipeline extension 15,000 LF	$1,000,000
Access Road 1-1/2 miles	$ 550,000
Estimate Construction Costs	$1,650,000
Engineering and Contingencies	$ 650,000
Estimated Project Costs	**$2,300,000**

Phase 4—Surface Impoundment

Dam	$ 600,000
Impoundment preparation	$ 100,000
Estimate Construction Costs	**$ 700,000**
Engineering and Contingencies	$ 300,000
Estimated Project Costs	$1,000,000

Estimated Total Project Cost: **$3,300,000**

Present Situation

Population

- Total Population: 384
- American Indian: 335

Housing

- Total Housing Units: 141
- Occupied Homes: 124

Water System:

Source—The Hydaburg River supplies raw water to the water treatment plant through a hydro turbine pump and a low-flow electrical backup pump.

Treatment—The water treatment plant houses three (3) 84-inch diameter pressure filters which are loaded with graded gravels, sand, and crushed anthracite filtration media. Influent flows are pre-treated by injection of liquid HMW cationic polymer coagulant at concentrations which remain less than 15 mg/l (ppm).

Storage—Treated water is stored in two 300,000 gallon bolted steel water storage tanks which are configured in series to maximize chlorine disinfection contact time (Ct). The system provides an approximate Ct of 88 mg-min/l while the minimum required Ct is approximately 60 mg-min/l.

Water System Deficiencies

Source—The water intake on the Hydaburg River is located at an elevation which is too low to provide pressurized gravity flow-through the water treatment plant and up to the water storage tanks without using either the hydro-turbine system or the electrical pump system. Electrical pumping costs to the community are high when river flows are too low to meet minimum community demands using the hydro-system.

Treatment—The water treatment plant has no capability to adjust treatment effectiveness automatically in response to frequent and rapid fluctuations in Hydaburg River raw water quality. Currently, the water treatment plant operator must perform a full jar-test sequence at lease once a day to establish the desired polymer injection concentration level. Under current system, the potential exists for injection of "too much" or "not enough" polymer coagulant to maximize the removal/reduction of color and turbidity below regulatory thresholds.

Excerpt of Hydaburg Resources Study (1984)

Pool Engineering, Inc.: Consulting Engineers and Surveyors prepared the following in 1984. The City of Hydaburg has experienced water quality problems in recent years and the community seeks funding assistance to address this serious health issue.

Basic Alternatives

Lakes offer one substantial advantage as a water source. During periods of low stream flow the lake water surface can be drawn down to meet the demands of the town and will refill

once snows melt and rain commence. Another possibility is to use several small streams together as the source for the town. This provides some reliability, both for quality and quantity, and also allows the facilities to be constructed in stages as funds and needs of the community in this manner:

1. ***Lake 1013*** has a water surface area of about 45 acres (2,000,000 square feet). The terrain is sufficiently high that timber potential is limited. The terrain slopes are gradual with substantial muskeg deposits and the water quality is probably poor. The new road is only one mile away which will facilitate construction. Sealaska owns the property.

2. ***Upper Eek Lake*** is at elevation of about 1114 feet with a surface area of about 50 acres (2,200,000 square feet). The lake is deep and located in a steep cirque, which may promote good water quality. The high elevation and steep slopes indicate only very limited timber value. This remote site is located on U.S. Forest Service property which is also part of Sealaska over selection area.

3. ***South Branches of Saltery Creek*** are on Haida Corporation property. These three streams could be intercepted by a single pipeline at approximately the 300-foot elevation level to serve the town. Eventually, this area may have some timber potential though.

In addition, two other alternatives could meet the needs of the community and warrant serious consideration:

4. ***North Branch of the Hydaburg River*** offers the largest apparent flow volume under most conditions evaluated for watersheds less than the entire river basin. This watershed could readily be protected as it is within the basin where the City holds a current water right. An inlet at about elevation 300 would allow gravity flow into a new City reservoir. The watershed lies on Sealaska property, which is designated for timber harvest.

5. ***Hydro-turbine Powered Pump*** installed at the cascade on the Hydaburg River about one mile north of town could lift flow into a new City reservoir without using an electric power or diesel fuel to operate the pump. The watershed lies mostly on Haida Corporation property, some of which is designated for timber harvest. Upstream, the watershed also includes the Sealaska property mentioned above on the north branch of the Hydaburg River.

Comparisons

These five basic source alternatives are compared in Table 3 including a minimal reservoir of 300,000 gallons and distribution piping elements. Road requirements are shown as the additional mileage beyond the logging road now envisioned by Sealaska Corporation. There is no single readily apparent solution. Each alternative has advantages and each as disadvantages.

These basic alternatives were discussed at length with the City staff and in several sessions with the City Council to ensure all concerns are aired. Financing is clearly the major concern with implementing any alternative, together with long-term protection of the watershed. A phased development is thus desirable to allow adjustment to various funding and community growth scenarios. Two Alternative Programs seem feasible and acceptable.

Table 3

Comparison of Basic Source Alternatives

	Lake 1013	Upper Eek Lake	3 Branches, Saltery Creek	North Branch, Hydaburg River	Hydro Turbine Pump, Hydaburg River
Property Owner	Sealaska Corporation	Sealaska Corporation	Haida Corporation	Sealaska Corporation—City Water Rights	Haida Corporation—City Water Rights
Pipe Line Length	24,000	30,000	21,000	23,300	8,000
Road Requirements	1.2	5.5	2.5	1.5	.5
Est. Construction Costs	$2,000,000	$3,800,000	$2,300,000	$2,100,000	$1,300,000
Est. Project Costs	$2,700,000	$5,200,000	$3,200,000	$2,800,000	$1,600,000
Reliable Water Flow	40 gpm & storage	63 gpm & storage	269 gpm	516 gpm	300+ gpm
Soils	Muskeg	Rocky	Thin	Thin	Muskeg
Basin Acreage	230	320	2,100	2,600	5,400
Timber Potential	Little	Little	Significant	Significant	Substantial
Inlet Elevation (feet)	1,000	1,100	300	300	100
Power Potential (kW)	40	40	None	None	Insignificant
Water Quality	Below Standard	Best	Acceptable	Acceptable	Acceptable

Alternate Program No. 1—Upper Eek Lake

The most suitable source, in terms of water quantity and quality, may be Upper Eek Lake if financing is obtainable. Figure 2 shows the suggested alignment of the pipeline and property ownership. The inlet into this body of water should be several feet below the normal water surface to allow the water level to be drawn down during period of low flow. Dropping the water surface of this lake by 1 foot should provide at least 1,700,000 cubic feet or 300 gallons per minute for one month. Thus the lake could provide the entire future needs of the town of Hydaburg completely through a winter season simply by drawing down the water surface 6 or 8 feet.

Environmental impacts from use of this source will be minimal. Fish are an important resource on the Lower Eek system. Water diversion on a mean annual basis will be negligible while winter flow from Upper Eek Lake would normally be zero due to ice.

Lake inlet configuration would be established during preliminary design. Dual inlets with screens at about elevation 1106 would seem suitable based on information presently available. Further analysis during preliminary design may suggest that an infiltration gallery would be preferable. A gravity flow gallery can be developed with perhaps three arms, which need be back flushed by a portable pump only two or three times per year. A simple screened inlet would require even less maintenance though, and is therefore preferred.

An 8-inch ductile iron pipe would be recommended for a transmission line. Construction costs were estimated as about $50 per linear foot (LF) in place without considering road needs. A grade of 10 percent is proposed for the road with the profile shown on Figure 3.

A constant 300-gpm flow would generate about 40 kW during the fall of some 700 feet into the Saltery Creek valley. At $0.12 per kilowatt-hour this power could be worth $30,000 per year. Alaska Power and Telephone Company is interested in exploring any potential power source with the City of Hydaburg.

A new reservoir location for the town should be established on the ridge within the city limits east of the Hydaburg River as shown on Figure 4. This ridge would allow a ground tank to be erected at an elevation of at least 150 feet above sea level. The desired 600,000 gallons storage needs should be split between at least two tanks for reliability so one can be out of service for cleaning. Chlorination would also be accomplished at the reservoir site, together with any additional treatment, which may be eventually be found necessary.

The existing pumping installation should be maintained in a serviceable condition as a standby water source. This would provide additional reliability at only a small cost.

Project costs for the Alternate Program No. 1 are summarized in Table 4 as a 1983 estimate.

Table 4

Alternate Program No. 1—Estimated Costs

Work Item	Quantity	Unit Price	Total Price
Inlet Facility	1 each	Lump Sum	$50,000
8-inch Pipeline	32,500 LF	$50/LF	$1,630,000
Single Lane Road	22,000 LF	$70/LF	$1,540,000
Storage Facility	2 @ 300,000 gallons	$500,000 each	$1,000,000
Chlorination & Metering	1 each	Lump Sum	$30,000
Distribution Piping	3,500 LF	$60/LF	$210,000
Estimated Construction Cost			**$4,410,000**
Survey		$80,000	
Geotechnical		$40,000	
Design Engineering		$210,000	
Construction Engineering		$70,000	
Estimated Engineering Fees			**$400,000**
Contingencies			$700,000
Estimated Project Costs			**$5,500,000**

A phased implementation program may be necessary due to limitations in available financing. Developing a new water source does not offer many possibilities for phased development since normally a project must essentially fully develop a facility in order to use any part of it. The water sources proposed for Hydaburg are rather unique in that an intermediate service level may be feasible. Saltery Creek is one of the basic alternatives considered herein, water quality is believed adequate and the proposed road/pipeline to Upper Eek Lake crosses two south branches of Saltery Creek at elevations of about 300 and 400 feet.

An infiltration gallery in each creek branch should be feasible for gravity flow into the proposed reservoir site where a single 300,000-gallon tank could meet immediate needs for the community. These branches of Saltery Creek are unlikely to provide sufficient flow volume to meet all future needs for the City of Hydaburg and logging operations will likely degrade water quality in time. As an interim source for a few years, however, these branches of Saltery Creek may well be adequate until sufficient funds exist to develop Upper Eek Lake. Estimated costs for this two-phase approach are summarized in Table 5. The total costs would be higher than for a single phase approach because the work spread over a longer period.

Table 5

Estimated Costs for Phased Development

Work Item	Phase I	Phase I Costs	Phase II	Phase II Costs
Inlet Facility	2 @ Saltery Creek	$80,000	Upper Eek Lake	$50,000
8-inch Pipeline	19,000 LF		16,000 LF	$800,000
Single Lane Road	7,000 LF	$500,000	16,000 LF	$1,120,000
Storage Facility	1 @ 300,000 gal	$500,000	1 @ 300,000 gal	$500,000
Chlorination & Metering	Lump Sum	$30,000	Lump Sum	$10,000
Distribution Piping	3,500 LF	$210,000	None	$0
Estimated Construction Costs		**$2,270,000**		**$2,480,000**
Survey		$80,000		$20,000
Geotechnical		$40,000		$0
Design Engineering		$140,000		$50,000
Construction Engineering		$40,000		$50,000
Estimated Engineering Fee		**$300,000**		**$120,000**
Contingencies		$400,000		$400,000
Estimated Project Costs		**$3,000,000**		**$3,000,000**

Alternate Program No. 2—North Branch

Should the available funds be insufficient to implement even Phase I—Alternate Program No. 1 as described above, another water source is still possible, though perhaps with certain less desirable features. The Hydaburg River can be used as the future water source by moving the intake further upstream. One basic goal of any new water source for the City is to eliminate the present power demands imposed by pump operation. A suitable gravity system should provide for the inlet at an elevation of about 300 feet. Figure 5 illustrates how this could be

achieved using the North Branch of the Hydaburg River. Estimated Costs for this program are summarized in Table 6.

Table 6
Alternate Program No. 2
Estimated Costs

Work Item	Quantity	Unit Price	Total Price
Dam	20 ft. high x 300 ft.	Lump Sum	$500,000
Impoundment Preparation	6 acres	Lump Sum	$50,000
Inlet Facility	1 each	Lump Sum	$50,000
Single Lane Road	7,900 LF	$70/LF	$550,000
8-inch Piping	23,300 LF	$50/LF	$1,170,000
Storage Facility	2 @ 300,000 gal.	$500,000	$1,000,000
Chlorination & Metering	1 each	Lump Sum	$30,000
Distribution Piping	3,500 LF	$60/LF	$210,000
Estimated Construction Costs			**$3,560,000**
Survey			$70,000
Geotechnical			$40,000
Design Engineering			$190,000
Construction Engineering			$60,000
Estimated Engineering Fees			**$360,000**
Contingencies			$600,000
Estimated Project Costs			**$4,500,000**

In addition to lower cost, Alternate Program No. 2 continues to use the existing watershed, the Hydaburg River, and in reduced area. Precedence established through long-term use should simplify any questions regarding watershed protection, while limiting the watershed to a smaller area allows harvest of valuable timber within the extensive remaining river basin.

Several significant concerns remain with this program though:

- Flow volume reliability for this study is based on the U.S. Forest Service equations and is subject to considerable potential error. Accordingly, a dam and impoundment is believed essential to ensure sufficient water during low flow periods.

- Surface water quality is subject to considerable variation. The single sample analysis summarized in Table 2 is hardly definitive assurance. Substantial sediment is likely during rainfall and the infiltration gallery/inlet may require frequent backwashing. This can only be accomplished by driving to the site with a gasoline powered pump and backwashing using the

impounded river water, which may contain substantial sediments. This task will be especially difficult during the winter.

- Fisheries resources are important in the Hydaburg River. During the winter low flow period the City water demand may have some impact on the fish habitat.

Funding remains a concern. Even though Alternate Program No. 2 is substantially less expensive than Program No. 1, it is still a substantial sum and full funding may not be forthcoming. A phased approach is possible, allowing water system improvements to be tailored to funds available, as described below:

Phase I—Increased Reservoir Capacity

Reservoir, 200,000 gal. Sited at quarry	$400,000
Distribution piping improvement 4,000 LF	$240,000
Improvements to existing pump station	$ 40,000
Estimate Construction Costs	$680,000
Engineering and Contingencies	$170,000
Estimated Project Costs	$850,000

Phase 2—Hydro-turbine Pump System at Old Dam Site

Dam renovations with inlet	$ 60,000
Turbine and pump with building	$ 100,000
Access Road ½ mile	$ 180,000
Transmission Pipe 8,000 LF	$ 400,000
Reservoir 300,000 gal. sited at quarry	$ 400,000
Chlorination and metering	$ 30,000
Estimate Construction Costs	$1,270,000
Engineering and Contingencies	$ 400,000
Estimated Project Costs	$1,670,000

Phase 3—Pipe Extension to North Branch of Hydaburg River

Infiltration gallery	$ 50,000
Pipeline extension 15,000 LF	$ 750,000
Access Road 1-1/2 miles	$ 350,000
Estimate Construction Costs	$1,150,000
Engineering and Contingencies	$ 400,000
Estimated Project Costs	$1,550,000

Phase 4—Surface Impoundment

Dam	$ 500,000
Impoundment preparation	$ 50,000
Estimate Construction Costs	$ 550,000
Engineering and Contingencies	$ 200,000
Estimated Project Costs	$ 750,000

Total Estimated Project costs—All 4 Phases $4,860,000

Costs are higher when the work is constructed sequentially in four phases instead of concurrently. In part, this added cost is due to the hydro-turbine pump, which is abandoned once Phase 3 is in place, and partly to the added overhead necessary to administer four separate projects instead of one.

Phased development of Alternate Program No. 2 depends on construction of a hydro-turbine pump facility during Phase 2 at the abandoned dam site, 1-1/2 miles north of the city. This

system does not require any electric power to lift the water to the quarry reservoir site, although it would use mechanical equipment—a turbine powered by the river falling some 20 feet. This machinery does introduce a reliability question; although the most serious concern is whether the river low flows provide enough excess water to power the quarry reservoir and the U.S. Forest Service runoff equations indicate that this volume may not always be available during the winter. Of course, the existing pump station, as renovated during Phase I, can be retained in standby status for emergency use.

Conclusions

Either Alternate Program can be developed into an acceptable water system for the City. We believe that **Upper Eek Lake** system would reliably supply better quality water with fewer environmental impacts; however, the cost is substantially more than developing the **North Branch system.** Therefore, final Program selection must wait until funding is identified, then the City can select the program and phasing best suited to the community's circumstances.

Hydaburg, Alaska
Water Source Conservation and Optimization Study
ANTHC Project No. AN 02-Q88

Prepared for:

ANTHC
1901 South Bragaw, Suite 200
Anchorage, Alaska 99508

Prepared by:

PDC, Inc. Engineers
2700 Gambell Street, Suite 500
Anchorage, Alaska 99503

PDC INC. ENGINEERS

August 2006

Hydaburg, Alaska
Water Source Conservation and Optimization Study

ANTHC Project No. AN 02-Q88
August 2006

Prepared by David Arehart, PE
PDC, Inc. Engineers

Prepared for:

Alaska Native Tribal Health Consortium
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1901 Bragaw Street, Suite 200
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I. EXECUTIVE SUMMARY

The objectives of this study are as follows:

- Identify and evaluate alternate raw water sources.
- Undertake a water distribution system leak assessment.
- Complete water service freeze protection measures.
- Produce a Water System Map using as-built information and field confirmation of water main and service valves.
- Perform an assessment of City fire hydrants.
- Evaluate water system capacity and projected and present water usage.

A business plan was one of the original study objectives, however, this plan was deleted due to lack of financial data from the City. See Paragraph FINANCIAL STATUS OF OPERATING FACILITIES. Except for the business plan, each of these objectives is summarized in the following paragraphs.

Because drinking water quality is related to economic development and the utility business plan, compliance with drinking water standards is presented. However a comprehensive review of the water treatment process to meet standards is not part of this study.

A. Alternative Raw Water Sources

The North Branch Hydaburg River was selected from five alternatives in a 1984 water resources study for a new raw water source. Table 10 presents key items that were used to evaluate alternatives. See Figure 1 for locations of raw water resources evaluated in the 1984 Study. The City has completed the first two phases for moving their raw water source intake to the North Branch of Hydaburg River. The final two phases are as follows:

- **Phase III** – Construct North Branch infiltration gallery, extend transmission pipeline 15,000 ft, and build 1 ½ miles of access road. Total estimated cost in 1984 was $1,550,000; in 2006 dollars it is $3.0 million.
- **Phase IV** – Construct North Branch impoundment. Total estimated cost in 1984 was $750,000; in 2006 dollars it is $1.4 million.
- **Total Estimated Costs Phase III and IV** - $4.4 million (2006 dollars).

  Note: 1984 estimate is converted to 2006 dollars using a 3% annual inflation rate over a 22 year period.

Completion of Phases III and IV will eliminate pumping costs and replace an aging wood crib dam with an impoundment on the upper North Branch of Hydaburg River. R&M Engineering (Ketchikan) August 2004 draft safety inspection report indicates that the wood crib dam is stable and sound. This report recommended dam repairs and not replacement.

The present raw water source can meet estimated future water needs, including reopening the seafood processing facility. During summer low river flow conditions and seafood processing the water turbine can not meet peak demand. Therefore the electric pump would need to be operated. The cost of running the electric pump could be made part of seafood processing operation costs.

Phase III and IV, moving the intake and impoundment to a higher elevation on the North Branch, will allow gravity flow from the impoundment intake, through the water treatment plant and, into the water storage tanks. It eliminates all water pumping and associated operation and maintenance costs. The cost of completing Phase III and IV dwarfs the cost of operating and maintaining pumps for the existing system. It is expected that grant money would be used to construct Phases III and IV. The City would see a reduction in water utility operating costs by eliminating all pumping and yet not bear the construction cost of Phase III and IV.

Because the existing intake and dam are in relatively good condition, of the short period of time electric water pumps would be operated, and of the possibility that the seafood processing plant can subsidize pump operation, it would be very difficult to obtain grant money to complete Phases III and IV. In the future however when the existing intake and dam need replacement, it would make sense to consider spending capital improvement money on Phases III and IV.

B. Water Distribution System Leak Assessment

Prior to March 2004, City water usage had been averaging 90,000 gallons per day (gpd). After leak assessment and repairs, water consumption dropped about 22% to 70,000 gpd. Consumption is now estimated to be 192 gallons per capita per day (gpcd). This consumption is still substantially above 150 gpcd average daily demand used for the 1992 Hydaburg Water Treatment Plant (WTP), Project No. AN-87-366 Ph II Rev. Water treatment expenses are reduced by eliminating leaks or purposely wasting water as a freeze protection measure. The following are opportunities to further reduce water waste.

- Eliminate building plumbing leaks through public education or direct intervention.
- Provide freeze protection of exposed water service risers to eliminate resident's need for running water to prevent freezing pipes.
- Shut off water to vacant, unattended buildings.
- Devise more secure water dispensing for seasonal use at the City Harbor.
- City utility maintenance supervisor needs to review all leaks identified during FH Inspection, November 2003 Field Work, and through sources other than this Study, and confirm repairs have been or need to be made.
- Install water meters at each service and bill based on water used. This type of billing would establish an economic incentive to conserve water.
- Presently customers are not assessed for high water use. Billing based on water use would help sort out legitimate water use from water being wasted from poorly maintained plumbing.
- To periodically assess water distribution system tightness we recommend installing a flow meter where the water distribution main connects with tank storage and, installing a few more valves in the system to allow isolating districts within the distribution system. Comparison of cumulative water leaving storage tanks with water from the WTP could help assess storage tank and fill pipeline tightness.

C. Water Service Freeze Protection Measures

Water service freeze protection measures were evaluated to reduce or eliminate residents' need for running water to prevent pipe freeze-up. Pipes considered for freeze protection are the water service riser and water supply plumbing in the unheated crawl space. The following is a

list of each freeze protection measure and estimated cost per unit. During a drive-by, street side survey of houses conducted in July 2003, 41 residences were identified that may need freeze protection.

- Measure No. 1 – Install insulated skirting around crawl space and insulate riser and plumbing in the crawl space. Heat trace is not installed.
  Estimated cost per unit is $19,600. For 41 units the estimated cost is $803,600.
- Measure No. 2 – Insulate riser and plumbing in the crawl space and install electric heat trace on all water pipe. No insulated skirting installed.
  Estimated cost per unit is $6,100. For 41 units the estimated cost is $250,100.
- Measure No. 3 - Install insulated skirting around crawl space, insulate riser and plumbing in the crawl space, and install electric heat trace on all water pipe.
  Estimated cost per unit is $22,800. For 41 units the estimated cost is $934,800.

We recommend residences with complete skirting at Hydaburg be evaluated with regard to skirting condition and construction materials, occurrence of water wasting during freezing conditions, plumbing distribution within the crawl space, water pipe insulation, and water service freeze up history. This information will be valuable in confirming the best freeze protection measure.

The scope of this study did not consider the possible freeze protection residential water wasting provides for the water distribution system. An unintended consequence of reducing or eliminating water service wasting might be freezing of exposed or shallow bury water distribution mains and raw water transmission line.

D. Water System Maps

Water system maps based on record plans, an August 2003 aerial photo of the City, and field trip were completed. System maps are in Addendum A. These maps are intended for both maintenance and planning purposes. Maps will need to be updated as the system is modified and more accurate information is available. Mapping is provided to ANTHC in both paper and electronic format.

E. Water Main and Service Valve Locations

Fieldwork conducted for this Study included locating water main valves, operating each valve to make sure it worked, and spot checking record plan swing ties for service valves. Time did not allow field locating all distribution system valves. Record plan information that appears to be accurate and field measurements are recorded on the Water System Map in Addendum A. Based on field work, record plans for main and service valves north of the Hydaburg River Bridge are accurate. Of the valves operated during fieldwork only one valve, Valve V32 at the corner of South Cedar and Main Street, could not be closed and opened. The November 21, 2003 Trip Report in Addendum C gives a detailed account of work accomplished.

The City is pursuing funds for paving streets. It is very important to include within the paving contract requirements to install water line valve boxes and sanitary sewer manhole covers at pavement surfaces and roadway shoulders. Inoperable valves within the roadway must be removed and replaced before paving. Specifically we recommend new valves be installed on each side of the Hydaburg River Bridge abutments. Water line attached to bridges is inherently prone to damage; valves should be installed to isolate this pipe for repairs.

Suggested resources to complete field location of water main valves, sewer manholes, and service valves include the following:

- Water Main Valves - Backhoe, Operator, and Assistant. Approximately 3 days to finish potholing at water main valve locations. Valves will be closed and opened several times. Valves that are inoperable shall be removed and replaced.
- Sewer Manhole Covers – Backhoe, Operator, and Assistant. Approximately 3 days to locate sanitary sewer manhole covers buried in the street.
- Water Service Valves – Backhoe, Operator, and Assistant. Approximately 2 weeks. We recommend when existing service valve locations cannot be found in a reasonable time, install a new service valve. Typically the best valve location is at the first property line crossed by the water service pipe. To protect and locate a service valve after it has been located or replaced a valve vault should be installed. Example of a vault is the Ford Pitsetter shown in Addendum G.
- Other Equipment and Materials – Support truck, lifting chain, vibratory plate compactor, metal detector, pry bar, pick, shovels, 100 ft surveyor tape, 20 ft hand tape, survey notebooks, traffic cones, up to 4 water main valve replacement assemblies, and 12 curb stop valve replacement assemblies.

F. Fire Hydrant Assessment

A fire hydrant (FH) assessment consisting of a 13 point inspection, pressure and flow test, and flushing was completed. All FH assessed except FH 14 were operable. Since the Assessment, FH14 has been replaced. The field report and data sheet for each hydrant is in Addendum B and FH locations are shown on the Water System Maps. Table 2 in this Study is a summary of FH inspection results. Most FH needs identified were improving valve box access and bollard replacement. FH 24 was overlooked during the fieldwork. We recommend that the City's utility maintenance crew flush and complete the13 point inspection at FH 24.

G. Water System Capacity, Projected and Present Water Usage

From metered flow records at the WTP, present water consumption is 70,000 gpd. Projected future water demand is 160,000 gpd using a population of 400, 150 gpcd, and 100,000 gpd for seafood processing. For the seafood processing facility 100,000 gpd is the high and 50,000 gpd is the low estimate. Water demand cited in this study is the average daily demand.

The existing impoundment has a 5 million gallon storage capacity which is equivalent to 30 days of water at 160,000 gpd consumption. Stream flow data for Hydaburg River were not found. However, the 1984 Hydaburg Water Resources Study gave a 300 gallon per minute (gpm) reliable water flow for a hydroturbine powered water pump at the present impoundment. 300 gpm is water available for City use and should not be confused with river flow at this location. River flow would be at least 2,000 gpm including 1,700 gpm needed to operate the turbine. The North Branch of Hydaburg River was listed at 516 gpm reliable water flow available for City use. Water source locations are shown in Figure 1.

Using only the hydro turbine powered pump, the current system is capable of delivering up to 216,000 gpd or 56,000 gallons more than what is required for future demand with seafood processing. Highest water demand would occur in the summer when seafood processing reaches its peak. During summer low river flow conditions, operating just the 100 gpm electric

pump could supply 144,000 gpd and keep turbine water available for use. The cost of running the electric pump could be made part of seafood processing operation costs.

With the projected 160,000 gpd future demand and running only the 100 gpm electric pump during low river flow conditions, there could be a net shortfall of 16,000 gpd. Without water conservation during this period, Hydaburg's 300,000 gallon reservoir would last about 18 days.

Installing an additional 16,000 gpd or approximately 11 gpm pumping capacity at the existing pump house would allow tapping the impoundment reservoir to meet a maximum daily average demand of 160,000 gpd. The system would rely on the water reservoir for hourly peak demand.

H. Water Treatment Compliance

Residual chlorine and combined filter effluent (CFE) turbidity entering the system at the WTP are consistently in compliance. An exception is that CFE turbidity compliance was not met in September and November of 2004. Distribution system chlorine residual and total coliform are also in compliance.

The system is not in compliance with the Lead and Copper Rule (LCR), Long Term 1 Enhanced Surface Water Treatment Rule (LT1), and disinfection byproducts.

In the 2005 sampling round for LCR, lead and copper exceeded the regulatory Action Limit (AL). Water treatment is presently not meeting LT1. Turbidimeters on each filter are in place to meet LT1 monitoring requirements. Hydaburg's WTP Operator may not be aware of the LT1 turbidity reporting requirement.

Sampling data for disinfection byproduct in treated water exceeded Total Trihalomethane (THM) maximum contaminant level (MCL) by a little over 1%. Total Haleoacetic Acid was 67% below the MCL. Best management practices (BMP) for reducing disinfection byproducts have been executed on a trial basis. A major impediment to consistent application of BMP is the poor financial condition of the utility.

Water quality standards for seafood processing at Hydaburg's seafood facility would be the same as drinking water standards presently in place for the City's water system.

END EXECUTIVE SUMMARY

II. INTRODUCTION

The Alaska Native Tribal Health Consortium (ANTHC) has entered into a cooperative agreement with the City of Hydaburg to complete a water source, conservation, and optimization study, using grant funds acquired from the Alaska Village Safe Water (VSW) program. The City has plans to reopen an existing fish processing/cold storage facility, and an adequate, reliable water supply is an essential part of this plan.

The purpose and objectives of this study are as follows:

- Identify existing water consumption and required water source quantity.
- Identify causes of water system wastage and methods to reduce water system waste. This was accomplished through a leak assessment of the water distribution pipe.
- Identify and evaluate alternate raw water sources.
- Produce as-built information for the City's water distribution system.
- Perform an assessment of the City's fire hydrants.

III. PROJECT PLANNING AREA

A. Location and Access

Hydaburg is located on the southwest coast of Prince of Wales Island, along the Sukkwan Strait shoreline, 45 air miles west of Ketchikan. It is approximately 30 road miles south of Hollis. It lies at 55.21 North Latitude and 132.82 West Longitude (Section 12, T77S, R83E, and Section 7, T77, R84E, Copper River Meridian). Hydaburg is located within the Ketchikan Recording District. Figure 2 is an aerial photo of the City taken on August 25, 2003.

1. Airport and Barge Service

The State owns and operates a seaplane base in Hydaburg, with a FAA-designated approach. An emergency heliport is also available.

The City owns a dock and small boat harbor and desires to construct a breakwater and boat launch. A paved highway leads to Craig, Klawock, and Hollis. Lynden has weekly barge service between Seattle and Craig, Klawock, and Thorne Bay. The Alaska State Ferry has scheduled service between Ketchikan and Craig.

B. Environmental Conditions or Resources Present

1. Climate

The weather in Hydaburg is usually cool and comfortable. Prince of Wales Island is dominated by a moist, maritime climate. Summer temperatures range from 49 to 63°F; winter temperatures range from 32 to 42 °F. Average annual precipitation is 120 inches, including 40 inches of snow. July is usually the driest month and November the wettest of the year, though every month has rain.

2. Geology and Soil Conditions

City of Hydaburg limits encompass 0.3 square miles of land and almost 2 miles of shoreline. City limits are shown on the Aerial Photo, Figure 2. The City north and south of Hydaburg River is underlain by shallow bedrock which typically is within 10 feet of the ground surface. East of town development, north and south of Hydaburg River are muskeg areas.

3. Flood, Erosion, and Seismic Hazards

Flood hazard in Hydaburg is considered low by the U.S. Army Corps of Engineers. The estimated 100-year flood boundary is the 20-foot contour. Development below the 20 ft contour includes residential homes south of Hydaburg River along the west side of Main Street and Seafood/Cold Storage Facilities. Most of the City is above elevation 20 feet.

Riverbank, soil, and coastal erosion all occur in varying degrees. During floods substantial erosion along riverbanks and associated flood zone will occur. In timber-harvest areas, prior to reestablishment of vegetation, soil erosion increases above pre-development levels. Coastal erosion occurs in areas with steep slopes. Hydaburg is located in a neutral, low erosion area.

Hydaburg River is approximately 4 miles long, flows through the middle of the City, and empties into Sukkwan Strait. City development parallels the shoreline and has a small percentage of its development along the River. Tidelands at the river's mouth have developed over time to form a substantial sand bar that is exposed at extreme low tides.

Seismic activity is low. The nearest active fault, Fairweather Fault, lies in the Pacific Ocean to the west. Potential hazards associated with the Fairweather fault include local surface displacement, strong ground shaking, and earthquake-induced ground failures.

4. Historic Sites

Established by the Haida people in 1911, Hydaburg has remained a Native community. Totem Park is a historical park that contains a legacy of Haida carvers' work. The totem poles include those salvaged from sites outside of Hydaburg and restored for display.

5. Endangered Species and Critical Habitats

Fieldwork to identify endangered species and critical habitat was not part of this Study's scope. Existing water system facilities are under roadway or within platted utility easements and property being served by the system.

The system's dam and raw water intake are located on Hydaburg River, about 2 miles upstream from the river's mouth and above a 12-foot natural waterfall. Hydaburg River below the falls is catalogued as an anadromous fish stream that has spawning and rearing habitat for pink, chum, and coho salmon, and Dolly Varden, rainbow, and steelhead trout. Dominant vegetation along the riverbank is alder, Sitka spruce, red cedar, yellow cedar, and various species of under story brush.

C. Economic and Financial Profile

The economy in Hydaburg is largely supported by the fishing and timber industry. Commercial fishing permits are held by 39 residents. The Haida Corporation owns a substantial timber holding in the area immediately surrounding the City, although logging was suspended in 1985 due to a decline in the timber market. The Corporation's log storage facility and sort yard are leased to Sealaska Corporation. Residents are employed with Southeast Stevedoring part-time in shipping and loading Sealaska timber from the sort yard. Other leading employers are the City, public school, Haida Corp., Southeast Alaska Regional Health Consortium (SEARHC), and the Hydaburg Cooperative Association. The community is interested in developing an existing fish processing facility, a U.S. Forest Service Visitor Center, specialty woodworking shop, and a mini-mall/retail center. Subsistence food sources include deer, salmon, halibut, shrimp, and crab.

D. Potential Growth Areas

Generally speaking, economic growth for Hydaburg is linked to development of timber and fishing resources. Because many residents of Hydaburg are also shareholders in the Haida Corporation, the fortunes of this Corporation will also have an impact on Hydaburg. The following near and long-term development was identified from the 1984 Hydaburg Comprehensive Plan.

- Logging.
- Longshoring – Presently being done for Sealaska timber.
- Road Construction – Major road linking Hydaburg with Craig has been completed.
- Water and sewer utility construction – Completed major expansion includes new ductile iron water mains, water treatment plant, water storage tanks, and water supply impoundment facilities.
- Commercial Fishing.
- Fish Processing – Facilities at Hydaburg constructed in the 1980's and 1990's are idle. These facilities consist of a dry ice making and delivery plant built in the 90's, seafood processing plant built in the 90's, and cold storage facility built in the 80's. Both the seafood and dry ice plant were funded through a series of small grants. The moorage dock for these facilities is out of service because the aging dock is in need of repair and considered unsafe. In 1995, ownership of the fish processing plant was transferred to the City from Hydaburg Fisheries. Subsequently, the City has leased the seafood facility to the Haida Corporation. Community leaders are presently seeking capital to reopen the facility. A feasibility study for reopening the seafood plant was completed in May 2004 by the McDowell Group. An earlier McDowell Group study had concluded that a high-volume salmon product facility was not feasible in the foreseeable future. Given the obstacles for a high-volume operation identified in the first study, the May 2004 report concluded that a small scale, high value, labor saving equipment based operation tailored to the needs of a committed marketing group was feasible for Hydaburg. The initial product produced would be boneless king and coho salmon fillets.

E. Power Generation and Fuel Storage Facilities

Alaska Power & Telephone (AP&T) Co., based in Skagway, owns and operates the electric utility serving Hydaburg. AP&T provides electricity to many Southeast Alaska communities. Hydaburg was connected with the Prince of Wales electrical grid in October 2005. A local

AP&T diesel powered emergency electric generator has 21,000 gallons of fuel storage. Other fuel storage facilities in the community include Haida Oil Products (100,000 gallons) and THRHA/Haida Apartment Building (1,000 gallons).

F. Public Facilities and Housing

The Hydaburg River provides water which is treated and piped throughout the City. Piped gravity sewage receives primary treatment and is discharged through two outfalls into mixing zones located in Sukkwan Strait. Over 95% of all homes are plumbed. Currently, the City's Class 3 landfill is not approved by the State of Alaska Department of Environmental Conservation (ADEC).

The City has services such as a health clinic, Village Public Safety Officer (VPSO), jail, fire department, community hall, day care, youth center, and library. There are local attractions such as Totem Park, charter fishing, and sightseeing.

There are 133 single family detached homes in Hydaburg along with a few attached single family homes, duplexes, apartments and mobile homes. Most homes are occupied year round; only four are vacant due to seasonal use.

G. Public Administration

Hydaburg is a first class city incorporated in 1927 and is located in an unorganized borough. Sealaska is the regional Native Corporation. The City practices a Strong Mayor form of government with a Council consisting of six members. The City also employs a City Clerk, Fire Chief, VPSO, Public Works Foreman, Superintendent of Schools, and a school board consisting of five members. The City has a 4% sales tax.

H. Population

1. Present and Projected Population

State of Alaska demographic information was used for Hydaburg population projections. The population trend has been in a holding pattern since incorporation in the 1920s. Population has varied between 214 and 384 people. Currently, the City's population is 364. For the purposes of this report, it will be assumed that the population will hold steady at 400. This accommodates a possible small increase in population; yet does not present any unrealistic future population. There is no projected large growth in the population, but demand for water and sewer services could grow as newer homes with modern appliances are constructed. Hydaburg also has a significant number of retirees.

2. Number of Households to be Served

According to the 2000 Census housing characteristics, there are a total of 154 housing units; 133 of which are occupied. Of the 21 vacant homes, 4 are due to seasonal use. All homes are served with plumbing and heating. A few residents lack phone service. For estimating purposes, the current population of 364 is divided by 133, to obtain an average household of 2.7 people.

3. Number of People Benefiting from Project

All Hydaburg residents would benefit from a sustainable water source. In addition, a dependable water source is a critical requirement for reopening Hydaburg's fish processing facility.

IV. FUTURE CAPITAL PROJECTS, COSTS, AND SCHEDULES

A. Roads, Airports, and Ports

1. Roads

To reduce airborne dust, the City has pursued funding to pave streets. Currently streets have a gravel surface course. It is critical that street paving work also include the following:

- Install valve covers in the pavement for all water valves.
- Valves adjacent to pavement edge need to have valve covers brought to the surface and set in concrete. Digging to uncover buried valve in roadway shoulder will undermine and destroy pavement.
- All water valves need to be tested prior to paving and inoperable valves replaced before paving.
- Install new manhole ring and covers for the sanitary sewer located within the pavement and roadway shoulder. Reuse of existing manhole covers is not recommended. These covers are buried, their condition is unknown, and might have "Water" rather than "Sewer" manhole lettering. The first sewer manhole south of the Hydaburg Bridge was uncovered while searching for a water valve. This sewer manhole cover was marked "Water".

2. Airports

No aviation related projects were identified.

3. Ports

State has funding in the 2007 budget for harbor improvements at Hydaburg.

B. Power Generation and Fuel Storage Facilities

Hydaburg connection to the Prince of Wales electric intertie was completed in October 2005. Alaska Power & Telephone (AP&T) operates the electric utility. Previously the City's electric power was from a diesel powered generator. Hydaburg's diesel generator was retained for emergency power.

Blackbear Lake (BBL) hydroelectric project was developed to reduce Prince of Wales Island's dependence on diesel powered generators. Electric load forecasts using only the output from BBL distributed over the Prince of Wales electricity intertie calculated a power shortfall. This future power shortfall would need to be met using diesel powered generators or development of other hydroelectric sites. Currently peak power loads in the summer use the entire BBL generating capacity.

The Haida Corporation is taking the lead to develop a run-of-the-river hydroelectric plant on Reynolds Creek, located about 10 miles east of Hydaburg. A construction date has not been announced. In June 2004, Senate Bill 2243 allowing a 6-year license extension for Reynolds Creek passed the Committee on Energy and Natural Resources. Reason for project delay cited in the Bill was that a power purchase agreement was needed. In 2001 the estimated project cost was $7.4 million. Funding to date includes a $3 million Department of Energy Grant. Total capacity from Reynolds Creek would be 5 mW. In 1996 the peak demand in Hydaburg was 390 kW and a total 1,530 mWh for the year. A second significant local load would be Sealaska Corporation's Natzuhini logging camp. Restarting the Hydaburg fish processing facility would require on the order of 1,750 mWh per year. The financial benefit to the residents of Hydaburg would be potentially lower electric power rates, obtain power capacity to reopen the fish processing facility, and money paid for electricity would go to the local Native corporation, Haida Corporation. Excess power could be exported through the Prince of Wales electric intertie.

C. Community Facilities

No projects have been identified.

D. School and Headstart

The school is in the preliminary stages of being renovated. State GO Bond has funded $5,822,106 of the $6,128,533 total cost. The Hydaburg City School District (HCSD) is a component unit of the City.

E. Health Clinic

The health clinic was constructed in 1986. The City leases the clinic to the Indian Health Service under a one-year renegotiable lease.

F. Commercial Facilities

Funds are being sought to reopen the Fish Processing and Cold Storage Facility. The fish processing plant has been leased to the Haida Corporation.

V. EXISTING WATER FACILITIES AND PLANNING CONDITIONS

A. Project Planning Area Map

Maps showing the existing water system are included in Addendum A. Other maps showing system details follow a large scale, system wide key map. These maps locate fire hydrants, main valves, streets, water bodies, and buildings. These maps were generated using an aerial photo, record plans, and information from site visits made in 2003.

B. Existing System

The water system consists of the following:

- **Source** –The Hydaburg River is the City's raw water source. A dam and impoundment provide storage. From design criteria used for the 1992 Sanitation Facilities Improvements, Project No. AN-87-366 PH II Rev, the impoundment has a 5 million

gallon storage capacity. A water turbine powered pump and back-up electric pump draw water from an intake adjacent to the dam. The water turbine powered pump is rated at 150 gpm. With both pumps on, pumping capacity is about 250 gpm. These pumps provide water pressure for water treatment and then discharge to the treated water storage tanks.

The impoundment's dam measures about 80 feet wide and 10 feet at its highest point. Records indicate that it was constructed sometime before 1963. Repairs were made in the mid 80's.

Elevation of the intake at the dam is not sufficient to supply water to the storage tanks by gravity flow. To reduce operating costs a water turbine powered pump rather than an electric pump was originally installed at the intake to boost water pressure in the transmission pipe. Under normal conditions the water turbine supplies enough power to pump water through the WTP and into the water storage tanks. A back up electric pump was installed at the intake to operate when low river flow reduces the water turbine pump output.

- **Treatment** – Water is treated by three pressure filters with coagulant injection, soda ash, and chlorination. Maximum pressure filter treatment capacity is 300,000 gallons per day. Each filter has a turbidimeter with a Honeywell DR4500 circular chart recorder. Another turbidimeter is located on the combined filter effluent (CFE) just before it leaves the WTP.

- **Storage** – Treated water is stored in a pair of 300,000 gallon steel water tanks. Valves were configured in the 1990's to operate the tanks in series. Tank operation in series maximizes chlorine contact time, optimizes disinfection, and provides a timely turnover of stored water. High water level elevation in the tanks is 209 ft and low water is 188 ft

- **Distribution** – Water is distributed through a gravity flow, looped water distribution system. Distribution is through approximately 14,000 feet of ductile iron pipe. Waterline to the northern portion of the City crosses Hydaburg River Bridge. Presently this is the only water main serving the community north of the river. During Water Study fieldwork, great effort was made trying to locate a valve shown in record plans at the south bridge approach; no valve was found.

  Water line attached to bridges is inherently prone to damage. Therefore, valves should be installed to isolate this pipe for repairs. We recommend new water main valves be installed on each side of the bridge abutment. At a minimum, install one valve on the southern, water supply side of the bridge.

- **Fire Hydrants** – The system provides a very good density of fire hydrants. Currently there are 32 fire hydrant fixtures. The average straight-line distance between hydrants is about 340 feet.

- **Services** – Available record plans show nearly all services with curb stops. However curb stop locations on services from the old wood stave water mains are not considered accurate because these mains have been replaced with ductile iron pipe. Therefore services shown in Addendum A, Water System Maps include a curb stop location only if the source plans indicate ductile iron water main installation. Typical construction for

services would be copper tubing. Data gathered from our field work and record plans indicated that the system has 151 service connections. The following table, Table 1, gives a listing of service users.

Table 1: Water Service Users and Number of Connections

Service User	No.	Service User	No.
Single Family Residence	128	AP&T Generator	1
Church	2	Hyda Store	1
Fish Processing (Idle)	1	Vacant Stores	2
ANB Hall	1	City Shop	1
Clinic	1	Fire Hall w/ Apt	1
Post Office	1	City Hall	1
Haida Corp Office	1	HCSD School	2
Haida Construction Office	1	Harbor Master (Idle)	1
Head Start	1	Harbor Public Hose Bibb	1
Boys & Girls Club	1	Apts – 12 Units, Single Bdrm, Full Bath, Common Laundry	1
AP&T Office/Housing (vacant)	1		

C. History of Water Facility Improvements

Based on record plans and interviews water system improvements to date are the following:

- 1963 – Design for replacing the wood crib dam on Hydaburg River was completed but replacement dam was not constructed. In 1986 the wood crib dam was repaired for Hydaburg water supply use.
- Early 1970's – Installed ductile iron water main, fire hydrants, and services for housing along Cedar Street.
- Early 1970's – Lower Hydaburg River water supply. Installed pump house, infiltration gallery, 100,000-gallon redwood storage tank, and ductile iron water supply line to City water mains.
- Mid 1970's – Installed ductile iron water main, fire hydrants, and services for additional housing development along Cedar Street. Wood stave pipe along Main Street was still in service.
- Pre 1984 – Remaining wood stave water mains replaced with ductile iron pipe. Record plans for this work have not been located.
- 1984 to 86 – Replaced Lower Hydaburg River water supply. Installed water intake upstream at 100 foot elevation, repaired an existing log crib dam on Hydaburg River to impound water for intake, constructed approximately 6,900 feet of 8-inch transmission line along Deer Bay Road from the intake to a new chlorination shed, (2) 300,000 gallon water storage tanks at elevation 187 ft, water main from storage tanks to existing system, and water mains for Hetta Subdivision. A water turbine was installed at the intake to provide mechanical power for pumping water through the chlorination shed to the water tanks.
- Early 1990's – Installed ductile iron water main, fire hydrants, and services for housing

development along Copenhagen Street.

- Early 1990's – A 10 hp back up electric powered pump was installed in the Turbine Shed at the dam site to restore pumping capacity when low river flow reduces water turbine output. A power line specifically for the pump was constructed.
- Early 1990's – Improvements were made to increase the water turbine efficiency. Less water is now used to power the turbine.
- Early 1990's – A water treatment plant (WTP) was constructed along Hydaburg Highway, about 500 feet south of the Old Chlorination Building built in the 1980's (See Addendum A – Water System Maps). This shed is now used only for protecting valves. Chlorination takes place at the WTP.
- 2003 – Installed soda ash feed system as part of a pipe corrosion/lead and copper control project.
- March 2004 – The City is pursuing grants for Phase III water line and Phase IV impoundment construction. See Paragraph ALTERNATE RAW WATER SOURCES for a description of these Phases.

D. Condition of Facilities

For purposes of presenting facility conditions the water system was broken into the following ten elements:

1. Water Supply Impoundment
2. Wood Crib Dam
3. Intake
4. Water Turbine and Electric Pump
5. Raw Water Supply Line
6. Water Treatment Plant
7. Water Storage Tank
8. Water Distribution Pipe
9. Fire Hydrants
10. Water Main and Service Valves

- **Water Supply Impoundment** – The impoundment follows the meander of the river. Forest and riverbank vegetation surrounding the impoundment are in good condition. Consideration should be given to removing one particularly massive dead tree trunk in proximity to the intake and dam. The impact of the falling trunk could cause a short term problem, depending on which direction it falls. The watershed for the impoundment lies within both Haida Corporation and Sealaska Corporation land holdings. Timber harvest in the watershed above the impoundment poses the greatest risk to reduced water supply quality.

- **Wood Crib Dam** – This dam was constructed sometime before 1963. Dam repairs were undertaken from 1984 to 1986 as part of moving the City's water supply further upstream on the Hydaburg River. R&M Engineering in Ketchikan completed a draft safety inspection report in August 2004. The report indicates that the dam is stable and sound. Recommended dam repair included backfilling crib, installing new decking, and repairing the west wing wall. R&M's report also indicated that dam failure would not endanger the Hydaburg Highway, the City's Hydaburg River Bridge, or the church and ANB Hall located adjacent to the bridge.

- **Intake** – The intake consists of a concrete structure at the pond edge, followed by about 200 feet of 30-inch corrugated metal pipe leading to a concrete head box. Water is supplied to the water turbine shed from the head box by an 18-inch ductile iron pipe. The shed foundation is reinforced concrete supported at the river edge on 18-inch diameter, concrete filled columns. Columns are anchored in exposed bedrock. The water turbine penstock is located below the shed. Shed walls are concrete block and its roof and door is painted steel. The door has substantial corrosion along the threshold and will eventually need to be replaced. Replacement door could be fiberglass to withstand the cool humid environment. The intake structures just described were installed between 1984 to1986, and barring a natural calamity such as an earthquake or flooding, should have a useful life of at least another 40 years with routine maintenance.

- **Water Turbine and Electric Pump at Turbine Shed** – The water turbine at the intake has been and continues to be very reliable. It uses a portion of the intake's water, approximately 1,700 gpm, to drive a 150-gpm pump that discharges to the system's raw water transmission line. The water operator visits the intake routinely to adjust the output of the turbine to meet City's water consumption. Oil is added to the turbine's oiler during the Operator's visit as needed. Turbine operation anomalies can be observed during this visit.

  Typically the back up electric pump, installed in the early 1990's at the Turbine Shed, operates only a few weeks during each year to supplement water turbine pumping. Continuously operated electric pumps commonly last 10 to 20 years before components such as bearings will fail. Given that the pump's original parts do not prematurely wear out and operation continues to be limited, this electric pump should have a life on the order of 40 plus years. In later years, the problem may be that parts for the electric pump are no longer available.

  During our site visits and meetings with the Hydaburg water system operators and management, pump reliability was not brought up as an item of concern. Therefore, the electric pump operating frequency appears to be sufficient to exercise the pump and avoid leaking seals and other problems associated with long-term pump inactivity.

- **Raw Water Supply Line** – An 8-inch ductile iron raw water transmission line, approximately 7,500 feet long, was installed between the WTP and Intake. The main segment, 6,900 feet between the Intake and former Chlorination Shed, was installed between 1984 and 1986. In the early 1990's, a 600-foot extension was constructed between the Shed and new WTP. Properly installed, Hydaburg's ductile iron water line should have a useful life of at least 100 years. Ductile iron is a very rugged, corrosion resistant pipe material.

- **Water Treatment Plant (WTP)** – The WTP constructed during the early 1990's is in good condition. It has received good preventive maintenance and upgrades. While not critical to the primary operation of the WTP, the yard, offices, and general work areas need to be cleaned of clutter.

- **Water Storage Tanks** – The water storage tanks are a pair of 300,000 gallon, bolted steel shell tanks. Record plans show that both the tank bottom and ring wall foundation are reinforced concrete. In the early 90's, storage tank operation was modified so that

treated water enters only the eastern tank, uses an existing intertie to fill the western tank, and then flows to the distribution system. This helps maximize chlorine contact time and turnover of water storage.

Since construction in 1986, these tanks have not been painted. Given the age of the paint we recommend that plans be made to clean and paint the tank exterior and interior within the next 2 to 3 years.

Originally, each tank was provided with a hydraulically operated altitude valve. When the water level in the tank rises to a specified upper limit, the altitude valve is opened or closed to modify flow. In the early 1990's valves at the valve pit for the western tank were closed so that the tanks would operate in series. The original 10-inch altitude valve for the eastern tank was replaced with a 4-inch altitude valve. From record plan information, the normal flow rate into the eastern tank is 60 gpm. When the altitude valve opens the flow increases to 150 gpm. The current operational status of the altitude valve needs to be confirmed.

- **Water Distribution Pipe** – Cumulative length of water main pipe is about 14,000 feet. Pipe diameter ranges from 6 to 8 inches. All water mains are ductile iron. Ductile iron began to be installed at Hydaburg in the early 1970's. All wood stave water mains were replaced by the mid 1980's. Properly installed, Hydaburg's ductile iron distribution pipe should have a useful life of at least 100 years.

  High water consumption (See Table 3) indicated that the water distribution system was leaking. As a result of leaks identified during 2003 field work, repairs have been made that reduced water consumption by approximately 22%.

  Presently there is no meter that allows direct reading of water leaving the tanks and entering the water distribution system. Such a meter would be very useful to assess and isolate leakage within the distribution system. Current metering is for water delivered to the water storage tanks. Because the tanks buffer or delay impact of isolating water system districts, real time measurement of flow to the distribution system is not possible. Locating a meter after the water storage tanks would also be an effective tool for identifying water loss from the tanks.

- **Fire Hydrants** – From July 14 to 18, 2003, a fire hydrant (FH) inspection consisting of a 13 point inspection, pressure and flow test, and flushing was completed for fire hydrants. The field report and data sheet for each hydrant is in Addendum B. Prior to the July inspection, in late June to early July 2003, Bill Evans, Remote Maintenance Worker (RMW), SEARHC, led a team to repair City fire hydrants. Time and materials did not allow for all intended repairs to occur. Fire hydrants are dry barrel type.

  The following table, Table 2, is a summary of key fire hydrant inspection results. Locations of fire hydrants are shown on the water system maps in Addendum A.

Table 2: Summary of FH Inspection

	Comment
Fire Flow Tests	29 of the 32 FH were flow tested. FH 3 could not be tested because hydrant was leaking. FH 14 is inoperable and was not tested. (FH14 has since been replaced.) FH 24 was overlooked.
Low Flow and Pressure	FH 20, FH 21
Dirty Flush Water	FH 20, FH 21, FH 26, FH 27, FH 28, FH 29, FH 30, FH 31
Broken FH	FH 14 was inoperable during the Inspection. FH 14 replaced in March 2004.
Leaking FH	FH 3, FH 23
Hydrant Valve Stem Hard to Turn	FH 4, FH 6, FH 7, FH 8,
Bollards Needed, Replaced, or Relocated	FH 5, FH 9, FH 12, FH 13, FH 15, FH 16, FH 17
Valve Box Buried, Not Accessible, or Needs Other Maintenance	FH 12, FH 9, FH 13, FH 15, FH 16, FH 17, FH 18, FH 22, FH 23, FH 26, FH 27, FH 29, FH 30, FH 31
Port Cap Not Removable or Too Tight	FH 7, FH 8, FH 9, FH 12, FH 15, FH 22
Branch Valve Repair Needed	FH 10

- **Water Main and Service Valves** – Water main valve covers at Hydaburg are buried and not readily accessible. Covers were purposely buried to avoid damage from road grading equipment. The disadvantage of buried valve covers is that a great deal of effort is needed to locate and access the valve for operation. This is especially true when soil is frozen and swing tie measurements for a valve location are missing.

  Fieldwork conducted for this Study did include locating water main valves, operating each valve to make sure it worked, and spot checking record plan swing ties for service valves. Time constraints did not allow completion of this work. Fieldwork verified that record plans for main and service valves north of the Hydaburg River Bridge are accurate. Of the valves operated during fieldwork, only one valve, Valve V32 at the corner of South Cedar and Main Street, could not be closed and opened. The November 21, 2003 Trip Report in Addendum C gives a detailed account of work accomplished.

E. Utility Management

The City of Hydaburg consolidates management and operation of its water, sewer, and solid waste utilities. The Mayor has oversight of utility finances while the Public Works Foreman manages physical operations. The following positions were created to support the Mayor and Public Works Foreman:

- Assistant to the Public Works Foreman – Duties as directed by the Public Works Foreman.
- City Clerk/Treasurer – Responsible for proper maintenance of accounts receivable and receipt of cash; accounts payable and cash disbursements; and payroll.
- Water Treatment Plant Operator – Responsible for inspecting and operating the water facility, minor maintenance and repairs, and coordinating major maintenance and repairs.

- Water, Sewer, Solid Waste Laborers – Responsible for performing labor as necessary to maintain facilities and service.

F. Present Water Consumption, Leak Assessment, and Repair

The following are data used for evaluating present water consumption:

- Current City population of 364 in 133 households (or 2.7 people per household).
- Current student population for HCSD is 94 students. At 2.6 gallons per student per day (*Cold Regions Utilities Monogram*, ASCE, 3rd Edition), HCSD demands 244 gpd.
- Hydaburg does not have a community laundry facility. Laundry and bathing are done at individual residences.
- There are no hotels, restaurants, or bars.
- Fish processing plant is idle. If it were to be reopened, depending upon extent of operations, the water consumption is estimated to be 50,000 to 100,000 gallons per day. Estimate of water use is from a former plant operator.

Prior to March 2004, City water usage had been averaging 90,000 gallons per day. After leak assessment and repairs, water consumption dropped about 22% to 70,000 gallons per day. For comparison, Table 3 lists consumption rates before and after leak repair.

Table 3: Water Consumption

	gphd	gpcd	COMMENT
City Before Leak Repair	677	247	gphd is gallons per day per household; gpcd is gallons per day per person.
City After 2004 Leak Repairs	526	192	Consumption before leak repair, 90,000 gpd; after 2004 leak repair, 70,000 gpd.
Calculated Average City Water Demand	405	150	Source: Record Plans, 1992 Hydaburg WTP, Project No. AN-87-366 Ph II Rev, Design Criteria; Used an average of 2.7 People per Household.

Opportunities to realize immediate reductions in water consumption beyond 192 gpcd include the following:

- Eliminate building plumbing leaks through public education or direct intervention by the utility. Sources for water consumption reduction information programs are the American Water Works Association and American Public Works Association.
- Encouraging installation of low flow plumbing fixtures and devices such as low flow aerators for sink faucets. It may be cost effective for the utility to install certain plumbing fixtures. Cost of installation would at least need to equal value of water saved.
- Shut off water to vacant, unattended buildings.
- Devise more secure water dispensing for seasonal use at the City Harbor. Presently a hose is run from a hose bibb. This bibb is partially buried just above the shoreline.
- City utility maintenance supervisor needs to review all leaks identified during FH Inspection, November 2003 Field Work, and through sources other than this Study, and confirm repairs have been or need to be made.
- Freeze protection measures for water service riser in crawl space beneath houses. Existing practice is bleeding water from interior plumbing fixtures to avoid freezing pipes. By providing freeze protection, bleeding water at residential services will not be needed.
- Install meters on services. Meters allow identifying high water consumption that might

be associated with leaking plumbing fixtures. It also allows implementation of billing based on consumption. Consumption based billing produces an economic incentive for customer water conservation. Meters must be protected from freezing. To minimize labor costs and entering customer property remotely read water meters should be installed. A product cut sheet for this type of water meter is in Addendum G.

1. Water Service Freeze Protection Measures

Freeze protection measures presented address water service riser and plumbing located in the crawl space under buildings. Pile foundations commonly used at Hydaburg create an open air crawl space, 3 to 4 feet high, between the ground surface and floor supports. Depending on site topography, crawl space height can be much greater than 3 to 4 feet. Water services emerge from the ground within this crawl space. The portion of water service rising through the soil, crossing the crawl space, and entering the house is vulnerable to freezing. From a drive-by, street side survey of houses conducted in July 2003, 41 residences were identified that may require freeze protection. These houses had partial or no skirting.

Specific conditions at each Hydaburg water service may make application of one method more feasible than the other. We recommend residences with complete skirting at Hydaburg be surveyed with regard to skirting condition, occurrence of water wasting during freezing condition, plumbing distribution occurring within the crawl space, water pipe insulation, heat trace, and water service freeze up history. This survey information would be very useful to confirm the best freeze protection method for the community.

Cost estimate, advantages and disadvantages of freeze protection measures are presented in Table 4. Cost spreadsheet is in Addendum D.

Table 4: Cost Estimate for Freeze Protection Measures

PROTECTION METHOD	UNIT COST	HOUSE UNITS	TOTAL COST	ADVANTAGE	DISADVANTAGE
Measure No. 1 - Insulated Skirting, Crawl Space Water Pipe and Riser Insulation Only; No Heat Trace.	$19,600 per House	41	$803,600	1. No electric heat trace maintenance and operation cost.	1. Open crawl space access panels greatly reduces freeze protection. 2. Risk that heat input – from soil and floor – will not be enough to overcome crawl space heat loss during extended periods of below freezing temperature. 3. Water wasting may still be required at lowest winter temperatures.
Measure No. 2 - Crawl Space Water Pipe and Riser Insulation & Heat Trace Only; No Skirting.	$6,100 per House	41	$250,100	1. Breaches in house skirting will not affect this method. 2. Eliminated skirting cost. 3. Effective during coldest weather.	1. Heat trace maintenance and operation cost. 2. Household water plumbing in crawl space also needs heat trace.
Measure No. 3 – Insulated Skirting, Crawl Space Water Pipe & Riser Insulation with Heat Trace.	$22,800 per House	41	$934,800	1. Effective protection during coldest weather. 2. Skirting reduces heat trace operation.	1. Highest capital cost of freeze protection measures evaluated. 2. Same Disadvantages as Measure No. 2.

2. Freeze Protection Measure No. 1 and Climatological Evaluation

Freeze Protection Measure No. 1 consists of insulated skirting and insulating the service riser and crawl space water plumbing but no heat trace. Measure No. 1 relies on residual heat from the ground and building.

To estimate freeze up time for crawl space water pipe under no-flow conditions, an initial water temperature of 34°F is used. Winter water temperature records were not available for Hydaburg, so records from the Ketchikan Water Treatment Plant were used. Winter water temperatures at Ketchikan range from as high as 43°F and to as low as 34°F. Maximum allowable freeze up time is the time for water to reach its ice nucleation temperature, 27°F. The following table lists estimated freeze up times for ¾ inch diameter water pipe with 1 inch insulation at various temperature combinations and no-flow conditions. A water system should not be allowed to fall below the Ice Nucleation Stage.

Table 5: Estimated Freeze-Up Time For Crawl Space Water Plumbing

Water Temp	Insulated Crawl Space Air Temp	Ice Nucleation Begins, 27°F	Complete Freeze Up
34°F	26°F	30 minutes	38 hours
34°F	25°F	15 minutes	14 hours
34°F	20°F	4 minutes	3 hours
Note: Times are for ¾ Inch Pipe with 1 Inch Thick Bondtex Closed Cell Polyethylene Insulation and no-flow conditions. ASCE, Cold Regions Utilities Monograph, Third Edition, Figure 4-17, was used for freeze time calculations.			

Small diameter pipe reaches ice nucleation in a matter of minutes. Crawl space temperature must not drop below 27°F. Given heat trace is not installed and temperatures drop below 27°F, then one or more household water taps need to be opened to allow warmer water from the water main to flow through crawl space pipes.

The nearest weather station with long term weather records is Annette Island, located approximately 50 miles east of Hydaburg. The following table, Table 6, is a selected listing of air temperatures from the National Oceanic and Atmospheric Administration (NOAA) data base. Fifty-six years of data were available for NOAA's calculations.

Table 6: Cold Weather Climatological Information

Month	Average Low Air Temperature	Lowest Recorded Air Temperature
Sept	48.0°F	33°F
Oct	41.7°F	18°F
Nov	35.1°F	-3°F
Dec	32.1°F	1°F
Jan	30.4°F	1°F
Feb	32.3°F	2°F
Mar	34.2°F	1°F
Apr	37.7°F	21°F
May	43.1°F	31°F
Note: All temperature were recorded at NOAA's weather station located at Annette Island, 50 miles east of Hydaburg.		

Monthly lowest recorded air temperatures, -3 to 1°F, indicate that a freeze protection measure must maintain crawl space air temperature 31 to 35°F above outside air temperatures. Variables strongly affecting crawl space air temperature are open access panels, floor insulation, and whether or not a building is heated. As stated earlier, we recommend residences with complete skirting at Hydaburg be evaluated with regard to skirting condition and construction, occurrence of water wasting during freezing conditions, plumbing distribution occurring within the crawl space, water pipe insulation, and water service freeze up history. Without such information we cannot determine if water service freeze protection Measure No. 1

will be successful during seasonal low monthly temperatures at Hydaburg.

Skirting Insulation – Recommended skirting is constructed using a 2x4 frame, plywood facing, and 2 inch thick extruded polystyrene (Dow Blue Board). Framing lumber shall be pressure treated for contact with soil. Plywood in contact with and within 12 inches of soil surface shall be pressure treated. Stainless steel nails should be used to join pressure treated wood because galvanized steel nails are corroded by chemicals present in pressure treated wood. For purposes of this study, finished surface for the skirting shall be factory painted standing seam metal panels attached to the skirting plywood. A selection of panel colors could be offered to accommodate owner's preferences.

Skirting crawl space without fixed vents can lead to humid conditions that promote wood rot. However, installing fixed vents reduces the freeze protection measures provided by skirting. Even with vents, skirting will still provide substantial freeze protection. Locating vents as far as possible from water piping will minimize freeze protection reduction.

Water Service Riser Insulation – Riser insulation is to be installed from the outside face of the subfloor to 12 inches below the ground surface. Riser insulation could consist of flexible corrugated 6 inch diameter HDPE tube such as Hancor non-perforated drain tile tubing filled with polyurethane insulation. Method of installation would involve splitting one side of the tube to allow slipping it around the water pipe. The tube is centered on the pipe, hose clamps hold the split tube together, the bottom is closed with soil, and then a small hole at the bottom of the tube is used to inject field foam polyurethane insulation. This insulation expands and hardens to hold the HDPE tube in place. A gap at the top of the tube is left to allow expansion of excess injected urethane foam. Hardened excess foam shall be trimmed with a knife. Depending on success of aligning the water pipe within the tube center, this method will provide at least 2 inches of insulation around the pipe.

Crawl Space Plumbing - Length of pipe needing freeze protection increases substantially where the service riser meets distribution plumbing using the crawl space. Typically there would be a valve between household distribution plumbing and the riser. The insulated HDPE tube would terminate at this valve. Valves and plumbing in the crawl space would be insulated using Bondtex® or similar closed cell, flexible polyethylene pipe insulation.

3. Freeze Protection Measure No. 2

This measure differs from the previously described freeze protection in three significant ways. First, skirting is not installed. Second, electric heat trace is installed on all water piping in the crawl space. Third, the insulated service riser is heat traced. Heat trace embedded in insulation and located below ground will need to be installed in a channel to allow replacement.

4. Freeze Protection Measure No. 3

This measure combines Measure No. 1, skirting and pipe insulation, with Measure No. 2's heat trace. It has the highest capital costs of measures evaluated. It will, however, reduce heat trace operation by increasing the crawl space ambient air temperature.

G. Projected Water Usage

The significant water demands at Hydaburg used to estimate future water usage are residential and commercial. The major commerce with significant water demand is the fish processing facility and associated ice making. Presently this facility is idle. The design population for this Study is 400 and average household size is 2.7 people. Population trends were discussed previously. The following table, Table 7, lists projected consumption and current water system capacity:

Table 7: Projected Water Consumption and Supply and Treatment Capacity

PROJECTED WATER CONSUMPTION		
WATER USER	gpd	ACTION/COMMENT
Residential Population of 400 at 150 gpcd	60,000	Non-residential use aside from fish processing is negligible. 150 gpcd is Design Criteria from 1992 Hydaburg WTP, Project No. AN-87-366 Ph II Rev.
Fish Processing – High Use	100,000	Estimate based on information from former plant operator.
Fish Processing – Low Use	50,000	Estimate based on information from former plant operator.
Total	160,000	gpd with High Fish Processing Water Use
SUPPLY AND TREATMENT CAPACITY		
	QUANTITY	ACTION/COMMENT
HYDABURG RIVER IMPOUNDMENT	5 million gallons of storage	Storage is approximately 4 weeks of projected water use. Access to storage requires the use of either the hydro or electric pump.
HYDRO TURBINE USE	1,700 gpm or 2.4 mgpd	This turbine is used to pump up to 150 gpm to the WTP.
HYDRO PUMP	150 gpm or 216,000 gpd	A river flow into the impoundment of at least 1,882 gpm is needed to supply 150 gpm.
ELECTRIC BACKUP PUMP	100 gpm w/o hydro pump, 250 gpm w/hydro pump	Pump is designed to work in conjunction with or without hydro pump. Water passing through the supply/treatment system appears to be limited to 150 gpm by the east storage tank altitude valve.
WATER TREATMENT PLANT (WTP)	Up to 300,000 gpd	Design Criteria from 1992 Hydaburg WTP, Project No. AN-87-366 Ph II Rev. Altitude valve at storage tank appears to limit WTP production to 216,000 gpd.
TREATED WATER DELIVERY	150 gpm or 216,000 gpd	From record plans, the altitude valve installed at the eastern altitude pit allows up to 150 gpm to enter the eastern tank.
WATER STORAGE	600,000 gallons	Two 300,000 gallon tanks.

The present supply and treatment system is capable of meeting projected City water consumption with fish processing. The current WTP is capable of delivering 56,000 gallons per day more than what is required. During low river flow conditions, operating just the electric pump could supply 144,000 gpd and keep turbine water in the impoundment.

H. Water Quality

Raw Water - Hydaburg River water quality fluctuates frequently and quickly in response to rainfall patterns and storm intensity. The watershed is heavily vegetated, which has the benefit of reducing sediment load and turbidity. Rainwater percolating through the forest vegetation mat does dissolve organics, which are carried in solution by the water. The raw water has been tested on numerous occasions. The following are the most recent test results available:

Table 8: Raw Water Quality Data

SOURCE: NORTHERN TESTING LABORATORIES, INC., (NTL) 6/17/2003 SAMPLE, SEE ADDENDUM F. DESIGN CRITERIA, SHT D-1, PROJECT NO. AN-87-366 PHII, FEB 1991.				
ANNALYTE	RESULTS	MRL*1	MCL*2	ACTION
Color, True	75 Unit	25 Unit	15	Secondary MCL *3*4
pH	6.5 to 6.9		6.5 to 8.5	Secondary MCL
Suspended Solids	20 to 200 ppm			Not Reportable
Total Dissolved Solids	16 mg/L		500 mg/L	Secondary MCL
Alkalinity (as CaCO3)	9.00 mg/L	4.00 mg/L		
Conductivity	26.7 µmhos	5.00 µmhos		
Total Organic Carbon	7.89 mg/L	1.00 mg/L		
UV254	0.404 Absorbance	0.020 Absorbance		
Total Carbon Dioxide	11.9 mg/l			
Copper	< MRL	0.028 mg/L	1.00 mg/L	Not Reportable
Lead	< MRL	0.0028 mg/L	0.015 mg/L	Not Reportable
Calcium	3.8 mg/L	0.083 mg/L		
Iron	0.30 mg/L	0.11 mg/L	0.3 mg/L	Exceeds Limit
Magnesium	0.42 mg/L	0.056 mg/L		
Manganese	0.012 mg/L	0.0056 mg/L	0.05 mg/L	
Arsenic	< MRL	0.0028 mg/L	0.05 mg/L	Not Reportable
Chloride	< MRL	1.3 mg/L	250 mg/L	Not Reportable
Sulfate	< MRL	2.5 mg/L	250 mg/L	Not Reportable
Hardness as CaCO3	11 mg/L	0.37 mg/L		
Sulfide	< MRL	0.20 mg/L		Not Reportable

*1: Method Reporting Limit
*2: Maximum Contaminant Limit
*3: ADEC will require a public water system to meet secondary MCL if they determine public health is threatened or exceeding a secondary MCL is not in the public interest.
*4 18 AAC 70.020 - For drinking water and food processing, color may not exceed 15 color units or the natural conditions, whichever is greater.

Total Petroleum Hydrocarbon (TPH) sampling was done once because of a fuel contamination concern. Refueling had been done at a helicopter staging area in the watershed. This sample had 3.85 mg/l TPH. TPH present is attributed to natural organic matter from the watershed's forest and muskegs. Hydaburg's water supply also tested negative for volatile organics further indicating that TPH detected is from natural sources and not refined petroleum products.

Treated Water – Water quality standards for Hydaburg's drinking water are covered under Alaska Department of Environmental Conservation's (ADEC's) Drinking Water Regulations 18 AAC 80. Water quality standards for seafood processing at Hydaburg's seafood facility would be the same as drinking water standards. Treated water monitoring and reporting is required under ADEC's Drinking Water Regulations. Hydaburg has a Class A water system. A system is designated Class A by the ADEC if it serves at least 15 residences year-round. The following are results from the August 23, 2004 monitoring for disinfection byproducts:

Table 9: Treated Water - Disinfection Byproduct Data

DATE SAMPLED: 8/23/2004 DISINFECTION BYPRODUCT TEST RESULTS				
ANNALYTE	RESULTS	MRL*1	MCL*2	ACTION
Total Trihalomethanes	81 µg/L	0.50 µg/L	80 µg/L	Exceeds MCL
Total Haloacetic Acids	19.7 µg/L*3	3.00 µg/L	60 µg/L	Does not Exceed MCL

*1: Method Reporting Limit
*2: Maximum Contaminant Limit
*3: µg/L = one part per billion or 1 ppb

A copy of the laboratory report is in Addendum F.

As of January 1, 2004, all Class A systems serving less than 10,000 people with a surface water source shall comply with 18 AAC 80.300(b)(2)(C), Maximum Contaminant Levels (MCL) for disinfection byproducts (DBP's). Prior to January 2004, Hydaburg was exempt from disinfection byproducts MCL. Sample results for 2004 shown in Table 9 indicate compliance for Total Haloacetic Acids but just 1 µg/L or 1 part per billion over the Total Trihalomethanes MCL.

ADEC, Division of Environmental Health, Southeast Drinking Water Program, was contacted in late June 2006 concerning Hydaburg's water quality monitoring. The following is a summary of compliance:

- Primary and Secondary MCL's - With the exception of turbidity, Hydaburg was in compliance with primary and secondary MCL for drinking water through 2004. During 2004 turbidity was exceeded for 4 days in September and 2 days in November. Total coliform monitoring results from 1999 to date have consistently reported negative for coliform bacteria. Coliform monitoring results for December 2005, however, were not in the ADEC data base. Total coliform bacteria monitoring is a requirement of the Total Coliform Rule, and is used to indicate the microbial quality of treated water distributed to the public.

- Disinfection Byproducts (DBP) – DBP results for the 2004 monitoring effort reported TTHM's in excess of the MCL by 1 part per billion. Annual DBP monitoring results for 2005 were well below the MCL's for both TTHM and HAA5. Sample results for the 2006 DBP monitoring effort have yet to be reported. Sampling protocol is to collect DBP samples during the summer when water temperature is the highest.

- Combined Filter Effluent (CFE) Turbidity - This parameter is measured to determine quality of filtered water produced by the water treatment plant. CFE turbidity is measured at least every four hours at a point where treated water exits the water

treatment plant. It is a composite measurement of all filter outputs. In 2004 turbidity MCL was exceeded 6.66% of the time in September and 13.33% in November and therefore was not in compliance for these months. Regulations require that 95% of samples collected during a month not exceed 0.3 NTU. Reports of daily turbidity and chlorine for November 2005 were not in the ADEC data base. For all months January 2005 through May 2006, Hydaburg was in compliance with the CFE turbidity requirements.

- Treated Water Chlorine Residual: Minimum chlorine residual (0.2 mg/l) has been consistently maintained in treated water as it leaves the WTP and enters the distribution system. Distribution system residual chlorine has been greater than or equal to 0.1 mg/l. Residual chlorine is tested at the same time and location as the monthly total coliform sample.

- Long Term 1 Enhanced Surface Water Treatment Rule (LT1) – Beginning in January 2005 this rule applies to Hydaburg's water system. It requires individual filter effluent (IFE) be continuously monitored for turbidity. The purpose of LT1 is to improve control of pathogens, specifically Cryptosporidium. A turbidimeter installed at each filter discharge must continuously monitor and record turbidity at least every 15 minutes. LT1 turbidity is reported each month. Without IFE turbidity monitoring, combined filter flow may allow a single filter to produce high turbidity water undetected. Presently ADEC only has records of combined flow turbidity where treated water leaves the plant is being monitored. In order to determine compliance with LT1, turbidity measurements at each of Hydaburg's filters needs to be submitted to ADEC. Turbidimeters and recorders have been installed at each filter. Hydaburg's WTP Operator may not be aware of the LT1 turbidity reporting requirement.

- Metals – Most recent monitoring results are from the first half of 2005. The Lead and Copper Rule's (LCR's) Action Level (AL) for lead was exceeded in this round of monitoring even though a soda ash addition program was implemented as described below. Given the utility's ongoing financial shortfalls, lack of water treatment chemicals may have contributed to exceeding both LCR and AL.

1. Copper and Lead Control

In an effort to control lead and copper concentrations and facilitate compliance with the LCR, the system implemented soda ash addition in its treated water. The soda ash feed system for lead and copper control became operational in March 2004. Soda ash raises treated water pH to reduce lead and copper concentrations at customers' taps. Results for lead and copper monitoring completed after the installation and start up of the soda ash addition system indicated the AL for lead was exceeded. The system needs to coordinate with the State on a corrective action plan for addressing compliance with the Lead and Copper Rule. The following Water Quality Data reference documents are in Addendum F:

- A copy of lead and copper sampling data received from ADEC.
- March 5, 2002 memo from the Southeast Alaska Regional Health Consortium (SEARHC) summarizes historical lead and copper monitoring results.

In addition to these documents, ANTHC completed a comprehensive water system corrosion control plan dated November, 2003. Refer to ANTHC Project No. AN 03-N47.

2. Trihalomethane (THM)/DBP Control

Increasing pH for corrosion control also increases formation of trihalomethanes (THM), a regulated substance. THM is a disinfection byproduct formed when chlorine, added to destroy pathogens found in raw water, reacts with organics naturally occurring in water. At Hydaburg, three best management practices (BMP) are used to minimize THM formation. The first is to control soda ash addition such that treated water pH remains below 8.2 but high enough for effective pipe corrosion control. The second BMP is to remove THM organic precursors during coagulation and filtration. Polymer coagulants commonly used in Alaska to optimize filtration were evaluated by ANTHC for both turbidity and TOC removal. In laboratory tests using raw water from Hydaburg's system, Nalcolyte® 8185 removed the most TOC. In actual application at Hydaburg, polymer 8185 was not as effective for turbidity removal as previously used polymer Nalcolyte® 8105. Therefore the system returned to using Nalcolyte® 8105 coagulant. The third BMP for minimizing THM formation at Hydaburg is to add chlorination after filtration and TOC removal efforts.

3. Water Quality Requirements for Seafood Processing

Water quality standards for seafood processing found in ADEC's 18 AAC 70, Water Quality Standards, Section 20, Water Quality Standards Table, are the same as drinking water standards.

I. Financial Status of Operating Facilities

Presently income generated by Hydaburg's water utility cannot meet operating expenses. Volunteers from the community, such as Clarence Peele, have been providing critical skilled labor to keep the water system operating. Long term operation of the system will depend upon Necessary chemicals for water treatment are being purchased by Others.

Success of maintenance and training assistance provided through ANTHC and affiliate agencies is directly related to the utility's financial status. Retaining trained certified operators recruited from Hydaburg or elsewhere depends upon the community's ability to financially sustain a water utility.

From a January 2006 Rural Utilities Business Advisor Program (RUBA) Status Report, Hydaburg has been focusing on a City FY06 budget and FY04 audit. The books were brought into auditable condition by a contract bookkeeper. Key items in the report are the following:

1. The utility is not receiving revenues sufficient to cover operating expenses.
2. The utility is not current in paying electric bills.
3. The utility is not current on filing tax deposits.
4. ANTHC has been doing water utility billing for the City and has achieved a 75% collection rate.

VI. ALTERNATE RAW WATER SOURCES

Alternate raw water sources were identified and evaluated by Pool Engineering, Inc. in a 1984 report titled Hydaburg Water Resources Study. Only excerpts from this Study were available for review. Five alternative water sources were discussed at length with the City. Financing and long term protection of the watershed were the major concerns. Phased development was the approach taken in order to minimize the financing burden. The following table, Table 10, lists these alternatives and characteristics used for evaluation. Location of each water source is shown in Figure 1.

Table 10: Raw Water Sources, 1984 Pool Engineering Study

	LAKE 1013	UPPER EEK LAKE	3 BRANCHES, SALTERY CREEK	NORTH BRANCH, HYDABURG RIVER	HYDRO TURBINE PUMP, HYDABURG RIVER
Property Owner	Sealaska Corporation	Sealaska Corporation	Haida Corporation	Sealaska Corporation & City Water Rights	Haida Corporation & City Water Rights
Pipe Line Length (ft)	24,000	30,000	21,000	23,300	8,000
Road Required (mi)	1.2	5.5	2.5	1.5	0.5
1984 Construction Cost (million $)	2.0	3.8	2.3	2.1	1.3
1984 Project Cost	2.7	5.2	3.2	2.8	1.6
Reliable Water Flow	40 gpm & storage	63 gpm & storage	269 gpm	516 gpm	300 gpm
Soils	Muskeg	Rocky	Thin	Thin	Muskeg
Basin Acreage	230	320	2,100	2,600	5,400
Timber Potential	Little	Little	Significant	Significant	Substantial
Inlet Elev (ft)	1,000	1,100	300	300	100
Power Potential (kW)	40	40	None	None	Insignificant
Water Quality	Below Standard	Best	Acceptable	Acceptable	Acceptable

Reliable water flow for the Hydroturbine Pump, Hydaburg River source is listed as 300 gpm. This should not be confused with actual stream flow at this location. 300 gpm should be interpreted as the Report's estimate of how much water a hydroturbine powered water pump could reasonably withdraw from the River. Considering both the reliable flow extracted for the water system, 300 gpm, and 1,700 gpm used by the hydroturbine, river flow at this source would be at least 2,000 gpm.

Upper Eek Lake and North Branch, Hydaburg River were selected by the City as the best alternates. Of these two alternatives, the North Branch was implemented. The North Branch alternative was organized into 4 phases. The first 2 phases have been completed. Phased development of the North Branch alternative is as follows:

- **Phase I** – Construct water storage tanks at quarry and distribution system pipe improvements. Completed Phase I.
- **Phase II** – Construct hydro turbine pump system at the Old Dam site, access road, 8,000-foot transmission line. Completed Phase II.
- **Phase III** – Construct infiltration gallery, extend transmission pipeline 15,000 ft, and construct 1 ½ miles of access road. Total estimated cost in 1984 was $1.6 million; in 2006 dollars it is $3.0 million.
- **Phase IV** – Construct an impoundment. Total estimated cost in 1984 was $750,000; in 2006 dollars it is $1.4 million.

The advantage of completing Phases III and IV will be constructing the raw water intake high enough to eliminate the need for pumps and associated costs of operating and maintaining these pumps. The entire system from impoundment intake to point of delivery would be by gravity flow. Furthermore, timber resources in the current water supply basin could be developed without affecting Hydaburg's water quality if the intake is relocated to the North Branch of Hydaburg River. See Figure 1 for raw water source locations.

It is estimated 160,000 gallons per day would be needed for both residential and fish processing use (See Section V., Paragraph PROJECTED WATER USE). This consumption uses the high estimate for fish processing. Estimated community water consumption using the low estimate for fish processing is 110,000 gallons per day. North Branch Hydaburg River has a reliable flow of at least 500 gpm and can supply 720,000 gallons per day. Therefore an intake installed on the North Branch will meet community water needs.

VII. LAND STATUS

A. Land Owners in Proposed Project Area

1. Federal

None identified.

2. State of Alaska

None identified

3. Regional Land Corporation

Sealaska Corporation owns land associated with this Study.

4. Village Land Corporation

Haida Corporation owns land associated with this Study. It also holds the lease to Hydaburg's seafood processing facility.

5. City or Tribal

City of Hydaburg owns land associated with this Study.

6. Native Allotments

None were identified

7. Homesteads

None were identified.

8. Other Owners

Property owners throughout the City with water system located within their property boundaries.

9. Existing Easements

The existing City water system, including dam and impoundment, lies completely within easements and right of way dedicated for water system use.

B. Traditional Use Areas

Forested and undeveloped areas outside water system easement can be used for such activities as hunting and berry picking.

C. Land Conflicts that Could Affect the Project, Platting Status

No conflicts were identified.

D. Proposed Solutions to Land Conflicts

No land conflicts were identified.

VIII. NEED FOR PROJECT

A. Health and Safety Concerns

No health concerns regarding quality of water presently being produced for distribution have been identified. In 2004, a soda ash feed system was installed at the water treatment plant for controlling lead and copper corrosion in pipe and joints. Lead and copper corrosion may lead to high levels of these metals and premature pipe failure.

R&M Engineers (Ketchikan) August 2004 draft safety inspection for the water system's dam indicated a dam failure would not pose a threat to major public and private property located downstream.

B. Environmental Concerns

Moving the intake to the North Branch of Hydaburg River would reduce the likelihood of timber harvest within the water system's watershed. The forest within the North Branch basin has a lower timber potential than the current watershed.

C. System Growth Capacity

The City has plans to re-open an existing seafood processing and cold storage facility, and an adequate water supply is an integral part of this plan. The present supply and treatment system as designed and constructed is capable of meeting projected City water consumption with fish processing.

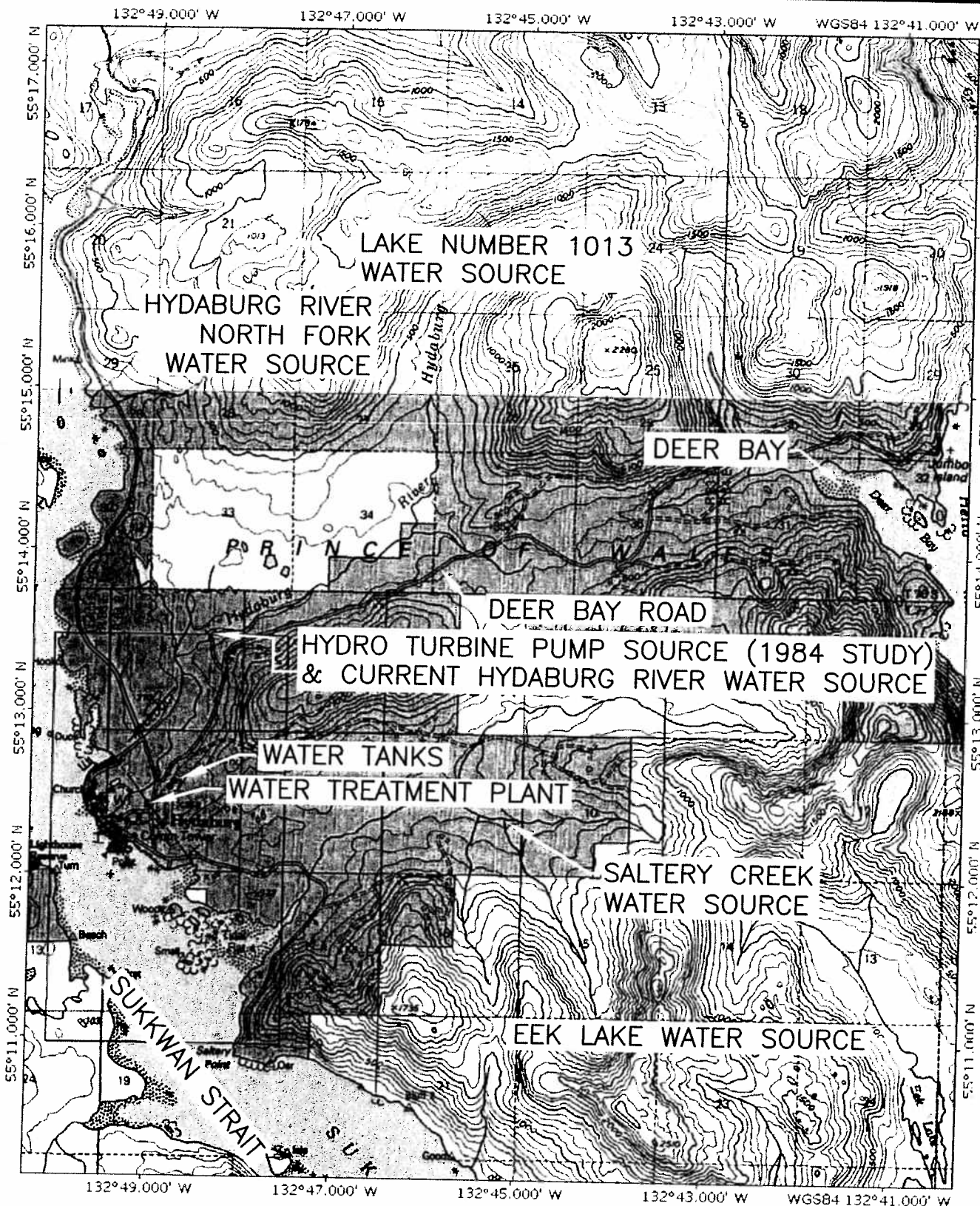
IX. PUBLIC PARTICIPATION IN THE PLANNING PROCESS

A. Methods Used to Gain Community Input and Direction

City leadership has provided the main drive and direction for water system improvements. PDC and ANTHC project managers met with the City Council on July 25, 2003 to report work progress and gather community input. Council members and concerned citizens spoke. See PDC's Meeting Minutes in Addendum C.

B. Identification of Community Goals and Objectives

The community's goal is to improve its economic base by reopening a seafood processing facility. An objective of this Study is to determine what water system improvements are needed to support reopening this facility.



MAP SOURCE:
USGS TOPOGRAPHIC MAP
CRAIG (A–3, B–3), 1997

1 1/2 0 1 2 3
SCALE UNITS IN MILES

HYDABURG, ALASKA
WATER CONSERVATION AND OPTIMIZATION STUDY
RAW WATER SOURCE LOCATIONS

DESIGN:	HC
DRAWN:	HC
CHECK:	DBA
	1–17–05

PROJ. No. AN02-Q88
FIGURE 1

ADDENDUM A – WATER SYSTEM MAPS

ADDENDUM B – FIRE HYDRANT DATA SHEETS

ADDENDUM C – JULY 18, 2003 CITY COUNCIL MEETING MINUTES
JULY 25, 2003 TRIP REPORT
NOVEMBER 21, 2003 TRIP REPORT

ADDENDUM D – FREEZE PROTECTION MEASURES COST ESTIMATE SPREADSHEETS

HYDABURG FREEZE PROTECTION MEASURE NO. 1 COST ESTIMATE

ITEM	QUANTITY	UNIT	UNIT COST	ITEM COST
Labor, Equip, O&P for Insulated Skirting	624	SF	$20	$12,480
Labor, Equip, O&P for Insulating Household Plumbing w/o Heat Trace	1	House	$837	$837
Labor, Equip, O&P for Insulating Service Riser w/o Heat Trace	1	House	$660	$660
Equipment Rental - Small Equip	1	House	$250	$250
Travel Including Lodging & Per Diem	2	man-trip	$150	$300
Construction Cost per Unit			SubTotal	$14,527
Furnish & Install (F&I) Cost per Unit	41	House	$14,527	$595,587
Community Administrative Expense @ 2% of labor account - Note 4	1	lot		$3,971
Professional Services (@ 4% of Construction Cost for 41 Units	1	lot		$23,823
Project Support (@12% of Construction Cost for 41 Units	1	lot		$71,470
Accounting Expenses	3	mo	$750	$2,250
			PROJECT SUBTOTAL	$697,101
			CONTINGENCY @ 15%	$104,565
			GRAND TOTAL (Y2005)	$802,000
			Cost Per House (Y2005)	$19,561

Estimating Notes:
1. From City map, average of 10 dwelling perimeters was 156 ft.
2. Say typical household crawl space water plumbing is 75 ft.
3. Say typical skirting is 4 ft high.
4. Say Labor Account is 1/3 of F&I Cost. Using cost to F&I is 1/3 Labor, 1/3 O&P, 1/3 Materials.
5. Plumbing Insulation Labor = $20/hrx4hrx3 + $35/hrx4hrx3; Riser Insulation Labor = $20/hrx4hrx3 + $35/hrx4hrx3
6. Heat Trace & Plumbing Insul Labor = $20/hrx8hrx3 + $35/hrx8hrx3; Riser Labor = $20/hrx8hrx3 + $35/hrx8hrx3

HYDABURG FREEZE PROTECTION MEASURE NO. 2 COST ESTIMATE

ITEM	QUANTITY	UNIT	UNIT COST	ITEM COST
Labor, Equip, O&P for Insulating Household Plumbing w/Heat Trace	1	House	$2,203	$2,203
Labor, Equip, O&P for Insulating Service Riser w/Heat Trace	1	House	$1,720	$1,720
Equipment Rental - Small Equip	1	House	$250	$250
Travel Including Lodging & Per Diem	2	man-trip	$150	$300
Construction Cost per Unit			SubTotal	$4,473
Furnish & Install (F&I) Cost per Unit	41	House	$4,473	$183,383
Community Administrative Expense @ 2% of labor account - Note 4	1	lot		$1,223
Professional Services (@ 4% of F&I Cost	1	lot		$7,335
Project Support (@12% of F&I Cost	1	lot		$22,006
Accounting Expenses	3	mo	$750	$2,250
			PROJECT SUBTOTAL	$216,197
			CONTINGENCY @ 15%	$32,429
			GRAND TOTAL (Y2005)	$249,000
			Cost Per House (Y2005)	$6,073

HYDABURG FREEZE PROTECTION MEASURE NO. 3 COST ESTIMATE

ITEM	QUANTITY	UNIT	UNIT COST	ITEM COST
Labor, Equip, Materials, O&P for Insulated Skirting	624	SF	$20	$12,480
Lbr, Equip, Matrls, O&P for Insulating Household Plumbing w/Heat Trace	1	House	$2,203	$2,203
Labor, Equip, Materials, O&P for Insulating Service Riser w/Heat Trace	1	House	$1,720	$1,720
Equipment Rental - Small Equip	1	House	$250	$250
Travel Including Lodging & Per Diem	2	man-trip	$150	$300
Furnish & Install (F&I) Cost per Unit			SubTotal A	$16,953
Construction Cost for 41 Units	41	House	$16,953	$695,063
Community Administrative Expense @ 2% of labor account - Note 4	1	lot		$4,634
Professional Services (@ 4% of F&I Cost	1	lot		$27,803
Project Support (@12% of F&I Cost	1	lot		$83,408
Accounting Expenses	3	mo	$750	$2,250
			PROJECT SUBTOTAL	$813,157
			CONTINGENCY @ 15%	$121,973
			GRAND TOTAL (Y2005)	$935,000
			Cost Per House (Y2005)	$22,805

ADDENDUM E – REVIEW COMMENTS

ADDENDUM F – WATER QUALITY DATA

ADDENDUM G – PRODUCT CUT SHEETS